VPDES PERMIT FACT SHEET

This document gives the pertinent information concerning the **reissuance** of the VPDES permit listed below. This permit is being processed as a **minor municipal** permit. The effluent limitations contained in this permit will maintain the Water Quality Standards of 9 VAC 25-260-00 et seq.

The discharge results from the operation of a **0.20 MGD oxidation ditch plant** serving the Town of Pembroke. This permit action consists of revising the loading limits for total suspended solids and BOD_5,, replacing the fecal coliform limit with an E. coli limit, and revising the special conditions. (SIC Code: 4952)

1. **Facility Name and Address:**
   Pembroke WWTP
   PO Box 5
   Pembroke, VA 24136
   Location: 126 Park Lane, Pembroke

2. **Permit No: VA0088048** Existing Permit Expiration Date: December 28, 2008

3. **Facility/ Owner Contacts:**
   Mr. Stanley Lucas, Utilities Director, 540-626-7607
   Mr. Dana Munsey, Mayor, 540-626-7191

4. **Application Complete Date:** September 4, 2008
   Permit Drafted By: Becky L. France, Environmental Engineer Senior
   Date: September 29, 2008
   DEQ Regional Office: West Central Regional Office
   Reviewed By: Kip D. Foster, Water Permit Manager
   Reviewer's Signature: _____ Date: 9/29/08
   Public Comment Period Dates: From 10/16/08 To 11/14/08

5. **Receiving Stream Classification:**

Receiving Stream:	New River (River Mile: 50.82)		
Watershed ID:	VAW-N29R		
River Basin:	New River		
River Subbasin:	NA		
Section:	1		
Class:	IV		
Special Standards:	u		
7-Day, 10-Year Low Flow:	514 MGD	7-Day, 10-Year High Flow:	842 MGD
1-Day, 10-Year Low Flow:	409 MGD	1-Day, 10-Year High Flow:	604 MGD
30-Day, 5-Year Low Flow:	732 MGD	Harmonic Mean Flow:	1616 MGD
Tidal:	No	303(d) Listed:	Yes

Attachment A contains a copy of the flow frequency determination memorandum.

6. **Operator License Requirements:** III

7. **Reliability Class:** II

8. **Permit Characterization**:

( ) Private ( ) Interim Limits in Other Document
( ) Federal ( ) Possible Interstate Effect
( ) State
(X) POTW
( ) PVOTW

9. **Wastewater Treatment System:** A description of the wastewater treatment system is provided below. See **Attachment B** for the wastewater treatment schematic and **Attachment C** for a copy of the site inspection report. Treatment units associated with the discharge are listed in the table below.

Table I
DISCHARGE DESCRIPTION

Outfall Number	Discharge Source	Treatment (Unit by Unit)	Flow (Design) (MGD)
001	Pembroke WWTP	bar screen comminutor grit chamber oxidation ditches (2) secondary clarifiers (2) UV disinfection banks (2) cascade aerator aerobic digestors sludge drying beds (4)	0.20

The Town of Pembroke operates a 0.20 MGD oxidation ditch system for the residents of the Pembroke area. The wastewater works consists of a bar screen, comminutor, grit chamber, oxidation ditches, clarifiers, UV light banks, cascade aerator, aerobic digestors, and sand drying beds. This facility began operation in 1996.

After flowing through a bar screen, comminutor, and grit chamber, the wastewater is routed through one of two aerated oxidation ditches. Then wastewater flows into two clarifiers. Solids that accumulate in a sludge hopper and the scum from the trough are wasted daily. The wastewater overflows the weirs and is disinfected by one of two banks of ultraviolet lights. Disinfected effluent flows through a cascade aerator and is discharged into the New River.

10. **Sewage Sludge Use or Disposal:** A VPDES Sewage Sludge Permit Application Form was submitted for this facility to address disposal of sewage sludge from the wastewater treatment

facility. Sludge is aerobically digested and then dewatered in drying beds. Dewatered sludge is periodically hauled to the New River Resource Authority in Dublin, Virginia.

11. **Discharge Location Description:** A USGS topographic map which indicates the discharge location, any significant dischargers, any water intakes, and other items of interest is included in **Attachment D**. The latitude and longitude of the discharge are N $37^0 18' 52''$, E $80^0 38' 34''$.

Name of Topo: Pearisburg Number: 112C

12. **Material Storage:** NA

13. **Ambient Water Quality Information:** Memoranda or other information which helped to develop permit conditions (special water quality studies, STORET data, and any other biological and/or chemical data, etc.) are listed below.

Pembroke WWTP discharges into the New River Watershed (VAW-N24R) as described in the 2006 Impaired Waters Summary (**Attachment E**). The Virginia Department of Health has issued a health advisory for a segment of the New River from the Route 114 bridge crossing just north of Radford downstream to the Virginia/West Virginia state line near Glen Lyn. This stream segment is impaired due to PCBs found in fish tissue.

Flow frequencies for outfall 001 were recalculated using flow frequencies for the gauges at Eggleston and Glen Lyn. The Eggleston gauge is located at the Route 730 bridge in Eggleston, Virginia 4 miles upstream of the discharge point. The nearest downstream continuous record gauge on the New River is located at Glen Lyn, Virginia. There are several discharges and withdrawals between the discharge point and the Glen Lyn gauge.

Since there is no current flow information for the Eggleston gauge, flow frequencies for the gauge were determined by calculating a ratio of Glen Lyn and Eggleston gauge data from the same period of record (1940 - 1976) and multiplying the ratio by the current flow frequencies at Glen Lyn. To solve for the flow frequencies at the discharge point, a ratio of the drainage area of the Eggleston gauge and the discharge point were used to calculate the flow at the discharge point. **Attachment A** contains a copy of the flow frequency determination memorandum.

The nearest downstream STORET monitoring station (9-NEW030.15) is located at the Route 460 bridge in Glen Lyn, Virginia. This station is just below APCO's intake and the APCO-Glen Lyn discharge for outfalls 001, 002, and 003. The 90^{th} percentile pH and average hardness used in the wasteload allocation spreadsheets were determined from STORET Station 9-NEW030.15 in Glen Lyn. Since the discharges from the APCO facility include noncontact cooling water, the temperature values at this station were not used to determine the 90^{th} percentile temperature value. Metals and PCB data have also been collected for this monitoring station.

The nearest upstream STORET monitoring station (9-NEW056.22) is located at the Route 760 bridge in Eggleston, Virginia. This station is located above the Celanese Acetate plant in Narrows and cannot be used for background metals data. Since there are no non-contact cooling

water discharges upstream of this station, the 90th percentile temperature used in the wasteload allocation was determined from this station. The monitoring data for these stations are included in **Attachment E**.

14. **Antidegradation Review and Comments:** Tier I ____ Tier II ___X__ Tier III _____

The State Water Control Board's Water Quality Standards includes an antidegradation policy (9 VAC 25-260-30). All state surface waters are provided one of three levels of antidegradation protection. For Tier I or existing use protection, existing uses of the water body and the water quality to protect these uses must be maintained. Tier II water bodies have water quality that is better than the water quality standards. Significant lowering of the water quality of Tier II waters is not allowed without an evaluation of the economic and social impacts. Tier III water bodies are exceptional waters and are so designated by regulatory amendment. The antidegradation policy prohibits new or expanded discharges into exceptional waters.

The antidegradation review begins with Tier determination. The New River is not listed as a public water supply in the segment where the discharge is located. The New River in this segment (VAW-N29R) is listed on Part I of the 303(d) list for PCBs in fish tissue. However, according to Agency guidance, fish tissue analysis and metals in sediments are not a basis for determining a receiving stream as Tier I. Available pollutant data have been analyzed, and the existing water quality condition for pollutants for which data exist compared to the water quality standards. This analysis indicates the water quality of the receiving stream does not exceed numeric criteria for any pollutant analyzed. Therefore, this segment of the New River is classified as a Tier II water, and no significant degradation of existing quality is allowed.

For purposes of aquatic life protection in Tier II waters, "significant degradation" means that no more than 25 percent of the difference between the acute and chronic aquatic criteria values and the existing quality (unused assimilative capacity) may be allocated. For purposes of human health protection, "significant degradation" means that no more than 10 percent of the difference between the human health criteria and the existing quality (unused assimilative capacity) may be allocated. The antidegradation baselines for aquatic life and human health are calculated for each pollutant as follows:

Antidegradation baseline (aquatic life) = 0.25 (WQS – existing quality) + existing quality

Antidegradation baseline (human health) = 0.10 (WQS – existing quality) + existing quality

Where:
"WQS" = Numeric criterion listed in 9 VAC 25-260-00 et seq. for the parameter analyzed
"Existing quality" = Concentration of the parameter being analyzed in the receiving stream

When applied, these "antidegradation baselines" become the new water quality criteria in Tier II waters, and effluent limits must be written to maintain the antidegradation baselines for each pollutant. Antidegradation baselines have been calculated as described above and included in **Attachment G**.

Antidegradation guidelines are applicable and have been applied to this permit reissuance. Water quality based effluent limits for pH and total residual chlorine (TRC) have been established in compliance with antidegradation requirements set forth in 9 VAC 25-260-30 of the water quality standards regulations. In accordance with antidegradation policy, pH will be maintained within the range of 6.0 S.U. and 9.0 S.U. The antidegradation review was conducted as described in Guidance Memorandum 00-2011, and complies with the antidegradation policy contained in Virginia's Water Quality Standards. The permit limits are in compliance with antidegradation requirements set forth in 9 VAC 25-260-30.

15. **Site Inspection:** Date: 8/5/08 Performed by: Becky L. France
Attachment C contains a copy of the site inspection memorandum.

16. **Effluent Screening and Limitation Development:** DEQ Guidance Memorandum 00-2011 was used in developing all water quality based limits pursuant to water quality standards (9 VAC 25-260-5 et seq.). Refer to **Attachment G** for the wasteload allocation spreadsheet and effluent limit calculations. See **Table II** on page 14 for a summary of limits and monitoring requirements.

A. **Mixing Zone**

The Agency mixing zone program, MIXER, was run to determine the percentage of the receiving stream flow that can be used in the antidegradation wasteload allocation calculations. The program indicated that 0.67 percent of the 1Q10 and 39.33 percent of the 7Q10 may be used for calculating the acute and chronic antidegradation wasteload allocations (AWLAs). A copy of the printout from the MIXER run is included in **Attachment G**.

B. **Effluent Limitations for Conventional Pollutants**

Flow -- The permitted design flow of 0.20 MGD for this facility is taken from the previous permit and the application for the reissuance. In accordance with the VPDES Permit Manual, flow is to be continuously measured.

pH -- The pH limits of 6.0 S.U. minimum and 9.0 S.U. maximum have been continued from the previous permit. These limits are based upon the water quality criteria in 9 VAC 25-260-50 for Class IV receiving waters and are in accordance with federal technology-based guidelines, 40 CFR Part 133, for secondary treatment. Grab samples shall continue to be collected once per day.

Biochemical Oxygen Demand (BOD_5), Total Suspended Solids (TSS) -- BOD_5 and TSS are technology-based requirements for municipal dischargers with secondary treatment required in accordance with 40 CFR Part 133. These concentration limits of 30 mg/L monthly average and 45 mg/L have been continued from the previous permit. The loading limits of 22 kg/day monthly average and 34 kg/day maximum weekly average have been revised to include only whole numbers. This change is in accordance with

Guidance Memo 06-2016 which specifies that loading limits should be given in whole numbers. The decimal places have been dropped rather than rounded to avoid backsliding.

The State Water Control Board 1976 Comprehensive Water Resources Plan, Planning Bulletin 205A states that the major point sources of BOD loading, which include the Town of Pembroke, are not projected to violate the BOD assimilation capacity in the New River through 2020. **Attachment E** contains an excerpt from this planning bulletin.

Since there has been a decrease in the flow frequencies at the outfall, the new data have been entered into the Regional Water Quality Model for Free Flowing Streams (Version 4.0) to reassess the BOD_5 limits. A copy of the model output results is found in **Attachment H**. An initial DO concentration of 0 mg/L, a TKN value of 20 mg/L, and 30 mg/L for BOD_5 were used in the model input. The background dissolved oxygen was 7.095 mg/L. The model predicted a dissolved oxygen (DO) sag at the initial discharge point to 7.092 mg/L. This sag is 0.003 mg/L below the existing background condition of 7.095 mg/L. So, these effluent concentrations do not violate the antidegradation policy. Therefore, current secondary treatment limits for BOD_5 are protective of the water quality, and a limit for DO is not needed to meet the DO water quality criterion in 9 VAC 25-260-50 for Class IV receiving waters. In accordance with the VPDES Permit Manual recommendations, TSS and BOD_5 shall continue to be monitored 3 days/week as eight-hour composite samples.

E. coli -- On January 15, 2003, new E. coli criteria became effective. The fecal coliform limitation has been discontinued because E. coli is a subset of fecal coliform, and a 126 N/100 mL monthly geometric average E. coli limitation is more stringent than the fecal coliform limitation in the previous permit. The water quality criterion for E. coli (126 N/100 mL monthly average) has been applied at the end of the discharge pipe. Grab samples shall be collected once per week between 10 AM and 4 PM. If the facility chooses chlorine as the disinfection method, the E. coli monitoring and limit will not be applicable.

C. Effluent Limitation Evaluation for Toxic Pollutants

In addition to the standard limitations, the discharge must be evaluated to determine whether there is a reasonable potential for the effluent to violate the water quality standards (WQSs) adopted by the State Water Control Board (9 VAC 25-260 et. seq). Toxic pollutant data submitted were above the quantification levels for ammonia, hydrogen sulfide, total recoverable copper, and total recoverable zinc. These data are summarized in **Attachment F**.

The water quality criteria and AWLAs for these parameters were calculated and are included in the spreadsheet in **Attachment G**. The acute and chronic AWLAs and the effluent data were used as input in the Agency's STATS program to determine if limits were necessary for ammonia. For ammonia, a default value of 9.0 mg/L was used as the

program input in accordance with Agency guidance. The program output indicates that permit limits are not necessary for ammonia, hydrogen sulfide, copper, or zinc. Copies of the STATS program results are included in **Attachment G**.

Total Residual Chlorine (TRC) -- As noted in Guidance Memorandum 00-2011, all chlorinated effluent must have a chlorine limit because there is a reasonable potential for the facility to cause or contribute to a violation of the standards. In case chlorine disinfection is needed, alternative chlorine limitations are included in Part I.B. In accordance with the current permit guidance, limits are expressed as numerical values even if below the detection limit. The Agency's STATS program was run to reassess permit limits for TRC.

The TRC limits in the previous permit were reassessed with the AWLAs that were determined from the decreased stream flow frequencies. Based on the acute and chronic AWLAs and the Agency's STATS program, permit limits of 0.13 mg/L monthly average and 0.16 mg/L maximum weekly average have been continued from the previous permit. When chlorine is used for disinfection, grab samples are required once per day.

17. **Basis for Sludge Use and Disposal Requirements:** Since the facility hauls dewatered sludge to a landfill, there are no sludge limits or monitoring requirements.

18. **Antibacksliding Statement:** Since there are no limitations less stringent than the previous permit, the permit limits comply with the antibacksliding requirements of 9 VAC 25-31-220 L of the VPDES Permit Regulation.

19. **Compliance Schedules:** There are no compliance schedules included in this permit.

20. **Special Conditions:** A brief rationale for each special condition contained in the permit is given below.

A. **Total Residual Chlorine (TRC) Limitations and Monitoring Requirements (Part I.B)**

Rationale: Should the permittee elect to disinfect by chlorine rather than UV light, this condition establishes TRC concentration limits after chlorine contact and final TRC effluent limits and monitoring requirements. This condition is in accordance with chlorine criteria in 9 VAC 25-260-140 of the VPDES Permit Regulation. Also, 40 CFR 122.41(e) requires the permittee, at all times, to properly operate and maintain all facilities and systems of treatment in order to comply with the permit. These requirements ensure proper operation of chlorination equipment to maintain adequate disinfection.

B. **Compliance Reporting under Part I.A and Part I.B (Part I.C.1)**

Rationale: In accordance with VPDES Permit Regulation, 9 VAC 25-31-190 J4 and 220 I, DEQ is authorized to establish monitoring methods and procedures to compile and analyze data on water quality, as per 40 CFR Part 130, Water Quality Planning and Management, Subpart 130.4. This condition is necessary when toxic pollutants are monitored by the permittee and a maximum level of quantification and/or specific analytical method is required in order to assess compliance with a permit limit or to compare effluent quality with a numeric criterion. This condition also establishes protocols for calculation of reported values.

C. **95% Capacity Reopener (Part I.C.2)**

Rationale: This condition requires that the permittee address problems resulting from high influent flows, in a timely fashion, to avoid non-compliance and water quality problems from plant overloading. This requirement is contained in 9 VAC 25-31-200 B2 of the VPDES Permit Regulations

D. **Indirect Dischargers (Part I.C.3)**

Rationale: This condition is required by VPDES Permit Regulation, 9 VAC 25-31-200 B1 for POTWs and PVOTWs that receive waste from someone other than the owner of the treatment works.

E. **CTC, CTO Requirement (Part I.C.4)**

Rationale: This condition is required by Code of Virginia § 62.1-44.19; Sewage Collection and Treatment Regulations, 9 VAC 25-790.

F. **Operations and Maintenance Manual Requirement (Part I.C.5)**

Rationale: Concurrent submittal of the manual to DEQ for approval is required by the VPDES Permit Regulation, 9 VAC 25-31-190 E to provide an opportunity for review of current and proposed operations of the facility.

G. **Licensed Operator Requirement (Part I.C.6)**

Rationale: The VPDES Permit Regulation, 9 VAC 25-31-200 D and the Code of Virginia 54.1-2300 et seq., Rules and Regulations for Waterworks and Wastewater Works Operators, require licensure of operators. A Class III operator is required for this facility.

H. **Reliability Class (Part I.C.7)**

Rationale: A Reliability Class II has been assigned to this facility. Reliability class designations are required by Sewage Collection and Treatment Regulations, 9 VAC 25-790-70 for all municipal facilities.

I. **Sludge Reopener (Part I.C.8)**

Rationale: This condition is required by VPDES Permit Regulation, 9 VAC 25-31-220 C for all permits issued to treatment works treating domestic sewage.

J. **Sludge Use and Disposal (Part I.C.9)**

Rationale: VPDES Permit Regulation, 9 VAC 25-31-100 P; 220 B2; and 420 and 720, and 40 CFR Part 503 require all treatment works treating domestic sewage to submit information on sludge use and disposal practices and to meet specified standards for sludge use and disposal. Technical requirements may be derived from the VPA Permit Regulation, 5 VAC 5-32-et seq. This special condition, in accordance with Guidance Memorandum No. 97-004, clarifies that the Sludge Management Plan approved with the reissuance of this permit is an enforceable condition of the permit.

K. **Total Maximum Daily Load (TMDL) Reopener (Part I.C.10)**

Rationale: Section 303(d) of the Clean Water Act requires that Total Maximum Daily Loads (TMDLs) be developed for streams listed as impaired. This special condition is to allow the permit to be reopened if necessary to bring it into compliance with any applicable TMDL approved for the receiving stream. The reopener recognizes that, according to Section 402(o)(1) of the Clean Water Act, limits and/or conditions may be either more or less stringent than those contained in this permit. Specifically, they can be relaxed if they are the result of a TMDL, basin plan, or other wasteload allocation prepared under Section 303 of the Act.

L. **Water Quality Criteria Monitoring (Part I.C.11)**

Rationale: State Water Control Law § 62.1-44.21 authorizes the Board to request information needed to determine the discharge's impact on State waters. States are required to review data on discharges to identify actual or potential toxicity problems, or the attainment of water quality goals, according to 40 CFR Part 131, Water Quality Standards, Subpart 131.11. To ensure that water quality criteria are maintained, the permittee is required to analyze the facility's effluent for the substances noted in Attachment A of this VPDES permit.

Water quality criteria monitoring for the 0.20 MGD facility was required during a previous permit term. **Attachment F** contains the results of this monitoring. Since the collection of these data, water quality criteria have been added for additional parameters.

So, monitoring is required for the additional parameters not previously monitored. Laboratory data summary sheets and chain of custody sheets shall be submitted with Attachment A of the permit to document the laboratory methods used, practicable quantification levels, field collection methods, and preservation methods.

M. **Conditions Applicable to All VPDES Permits (Part II)**

Rationale: VPDES Permit Regulation, 9 VAC 25-31-190 requires all VPDES permits to contain or specifically cite the conditions listed.

21. **Changes to the Permit:**

A. **The following special conditions have been deleted from the permit:**

1. The Bacterial Effluent Limitations and Monitoring Requirements Special Condition (Part I.C) has been removed because the facility bacterial data required by this special condition have been submitted and no further data are needed.

2. The Pretreatment Special Condition (Part I.F) has been removed because no significant industrial dischargers have been identified, and the permittee will be required to notify DEQ of the introduction of new pollutants from indirect dischargers (Part I.C.3).

B. **Special conditions that have been modified from the previous permit are listed below: (The referenced permit sections are for the new permit.)**

1. A Compliance Reporting under Part I.A and I.B Special Condition (Part I.C.1) has been revised to include information about significant figures.

2. The Operations and Maintenance Manual Special Condition (Part I.C.5) has been revised in accordance with the VPDES Permit Manual.

3. The Water Quality Criteria Monitoring Special Condition (Part I.C.11) has been revised to reflect new water quality standards.

C. **A new special condition added to the permit is listed below:**

The CTO, CTO Requirement (Part I.C.4) has been added in accordance with the VPDES Permit Manual.

D. **Permit Limits and Monitoring Requirements:** See Table III on page 15 for details on changes to the effluent limits and monitoring requirements.

22. **Variances/Alternate Limits or Conditions:** No variances or alternate limits or conditions are included in this permit. For the previous permit term, the permittee had requested that the 8-hour

composite data for TSS and BOD_5 collected during the permit term be used on the application in lieu of 24-hour composite samples. A waiver was requested to allow one pollutant scan instead of 3 samples for ammonia as nitrogen, TKN, and oil and grease. The permittee requested a waiver for phosphorus, total dissolved solids, nitrate plus nitrite nitrogen, and total residual chlorine. Since the receiving stream is not a public water supply or nutrient enriched there are no applicable water quality criteria for phosphorus, total dissolved solids, or nitrate plus nitrogen. Since the facility uses UV rather than chorine for disinfection, total residual chlorine data are not applicable to this facility. These waivers were approved on January 31, 2003. The waivers are consistent with current permit requirements, and therefore the previously approved waivers have been applied to this reissuance application.

23. **Regulation of Treatment Works Users:** The VPDES Permit Regulation, 9 VAC 25-31-280 B9, requires that every permit issued to a treatment works owned by a person other than a state or municipality provide an explanation of the Board's decision on the regulation of users. The Town of Pembroke, a municipality, owns this treatment works; therefore this regulation does not apply.

24. **Public Notice Information required by 9 VAC 25-31-290 D:**

All pertinent information is on file and may be inspected, and arrangements made for copying by contacting Becky L. France at:

Virginia DEQ, West Central Regional Office
3019 Peters Creek Road
Roanoke, VA 24019
540-562-6700
blfrance@deq.virginia.gov

Persons may comment in writing or by e-mail to the DEQ on the proposed permit action and may request a public hearing during the comment period. Comments shall include the name, address, and telephone number of the writer, and shall contain a complete, concise statement of the factual basis for comments. Only those comments received within this period will be considered. The DEQ may decide to hold a public hearing if public response is significant. Requests for public hearings shall state the reason why a hearing is requested, the nature of the issues proposed to be raised in the public hearing, and a brief explanation of how the requester's interests would be directly and adversely affected by the proposed permit action.

Following the comment period, the DEQ will make a determination regarding the proposed permit action. This determination will become effective, unless the DEQ grants a public hearing. Due notice of any public hearing will be given.

25. **303(d) Listed Segments (TMDL):** This facility discharges directly to the New River. The stream segment receiving the effluent is listed for PCBs in fish tissue in Part I of the 2006 303(d) list. The TMDL for this segment will not have a wasteload allocation for this discharge for

PCBs. No limit for PCBs is included in this permit because PCBs were not detected in the effluent.

26. **Additional Comments:**

A. **Reduced Effluent Monitoring:** In accordance with Guidance Memorandum 98-2005, all permit applications received after May 4, 1998, are considered for reduction in effluent monitoring frequency. Only facilities having exemplary operations that consistently meet permit requirements may qualify for reduced monitoring. To qualify for consideration of reduced monitoring requirements, the facility should not have been issued any Warning Letters, Notices of Unsatisfactory Laboratory Compliance, Letter of Noncompliance (LON) or Notices of Violation (NOV), or be under any Consent Orders, Consent Decrees, Executive Compliance Agreements, or related enforcement documents during the past three years.

The facility received the following Warning Letters and Notice of Violation within the past three years:

Warning Letter No. W2008-01-W-1006	E. coli exceedance
Notice of Violation No. W2007-06-W-003	failure to operate by O&M Manual
Warning Letter No. W2007-05-W-1006	failure to operate by O&M Manual
Warning Letter No. W2006-07-W-1025	contract laboratory deficiencies

The facility does not meet the criteria discussed above and therefore is not eligible for reduced monitoring.

B. **Previous Board Action:** None

C. **Staff Comments:** The discharge is not controversial, and is conformance with the existing planning document for the area. The permit is being reissued for a period of slightly less than five years to even out the DEQ staff permitting workload.

D. **Public Comments:** No comments were received during the public comment period.

E. **Tables:**

Table I	Discharge Description (Page 2)
Table II	Basis for Monitoring Requirements (Page 14)
Table III	Permit Processing Change Sheet (Page 15)

F. **Attachments**

A. Flow Frequency Memorandum
B. Wastewater Schematic
C. Site Inspection Report

D. USGS Topographic Map
E. Ambient Water Quality Information
- STORET Data (Station 9-NEW030.15)
- STORET Data (Station 9-NEW056.22)
- 2006 Impaired Waters Summary (Excerpt)
- 1976 New River Basin Comprehensive Water Resources Plan (Excerpt)

F. Effluent Data
G. Wasteload and Limit Calculations
- Mixing Zone Calculations (MIXER)
- Antidegradation Wasteload Allocation Spreadsheet
- STATS Program Results

H. Regional Water Quality Model (Version 4.0)
I. Public Notice
J. EPA Checksheet

Table II
BASIS FOR LIMITATIONS – MUNICIPAL

( ) Interim Limitations
(x) Final Limitations

OUTFALL: 001
DESIGN CAPACITY: 0.20 MGD

Effective Dates - From: Effective Date
To: Expiration Date

PARAMETER	BASIS FOR LIMITS	DISCHARGE LIMITS				MONITORING REQUIREMENTS	
		Monthly Average	Weekly Average	Minimum	Maximum	Frequency	Sample Type
Flow (MGD)	NA	NL	NA	NA	NL	Continuous	Recorded
pH (Standard Units)	1,2	NA	NA	6.0	9.0	1/Day	Grab
BOD_5	1	30 mg/L 22 kg/d	45 mg/L 34 kg/d	NA	NA	3 Days/Week	8 HC
Total Suspended Solids	1	30 mg/L 22 kg/d	45 mg/L 34 kg/d	NA	NA	3 Days/Week	8 HC
E. coli	2	126 N/100 mL (geometric mean)	NA	NA	NA	1/Week	Grab

NA = Not Applicable
NL = No Limitations; monitoring only
8HC= 8 hour composite

The basis for the limitations codes are:
1. Federal Technology-Based Secondary Treatment Regulation (40 CFR Part 133)
2. Water Quality Criteria

Table III
PERMIT PROCESSING CHANGE SHEET

LIMITS AND MONITORING SCHEDULE:

Outfall No.	Parameter Changed	Monitoring Requirement Changed		Effluent Limits Changed		Reason for Change	Date
		From	To	From	To		
001	BOD_5 and TSS			30 mg/L (22.7 kg/d) monthly average and 45 mg/L (34.0 kg/d) maximum weekly average	30 mg/L (22 kg/d) monthly average and 45 mg/L (34 kg/d) maximum weekly average	The loading limits were rewritten in whole numbers in accordance with Guidance Memorandum 06-2016 which specifies that loading limits should be listed in whole numbers. To avoid backsliding the numbers were rounded down.	8/6/08
001	E. coli	NA	1/Week	NA	126 N/100 mL geometric mean	The fecal coliform limit has been replaced with a more stringent E. coli limit.	8/6/08
001	Fecal Coliform	1/Week	NA	200 N/100 mL geometric mean	NA	The fecal coliform limit has been replaced with a more stringent E. coli limit.	8/6/08

Attachment A

Flow Frequency Memorandum

MEMORANDUM

DEPARTMENT OF ENVIRONMENTAL QUALITY - WATER DIVISION
3019 Peters Creek Road, Roanoke, Virginia 24019

SUBJECT: Flow Frequency Determination
Pembroke WWTP – Reissuance (VA0088048)

TO: Permit File

FROM: Becky L. France, Environmental Engineer Senior

DATE: July 30, 2008

This memorandum supercedes the June 12, 2003 memorandum concerning the subject VPDES permit. Pembroke WWTP discharges to the New River near Pembroke, Virginia. Stream flow frequencies are required at this site to develop effluent limitations for the VPDES permit.

The USGS has operated a continuous record gauge on the New River near Eggleston, Virginia (#30171500) from 1915 to 1976. The gauge is located at the Route 730 bridge in Eggleston, Virginia. Flow has been regulated at the gauge by Claytor Reservoir since 1940. This gauge is located approximately 4 miles upstream of the discharge point. The nearest downstream continuous record gauge on the New River is located at Glen Lyn, Virginia (#03176500), and has been operating since 1927. There are several discharges and withdrawals between the discharge point and the Glen Lyn gauge.

Since there is no current flow information for the Eggleston, Virginia gauge, flow frequencies for the gauge were determined by calculating a ratio of the Glen Lyn and Eggleston gauge data from the same period of record (1940-1976) and multiplying the ratio by the current flow frequencies at Glen Lyn. To solve for the flow frequencies at the discharge point, a ratio of the drainage area of the gauge (Eggleston) and the discharge point were used to calculate the flow at the discharge point.

The high flow months are January through May. The flow frequencies for the discharge point are listed on the attached table.

Flow Frequency Determination: Pembroke WWTP

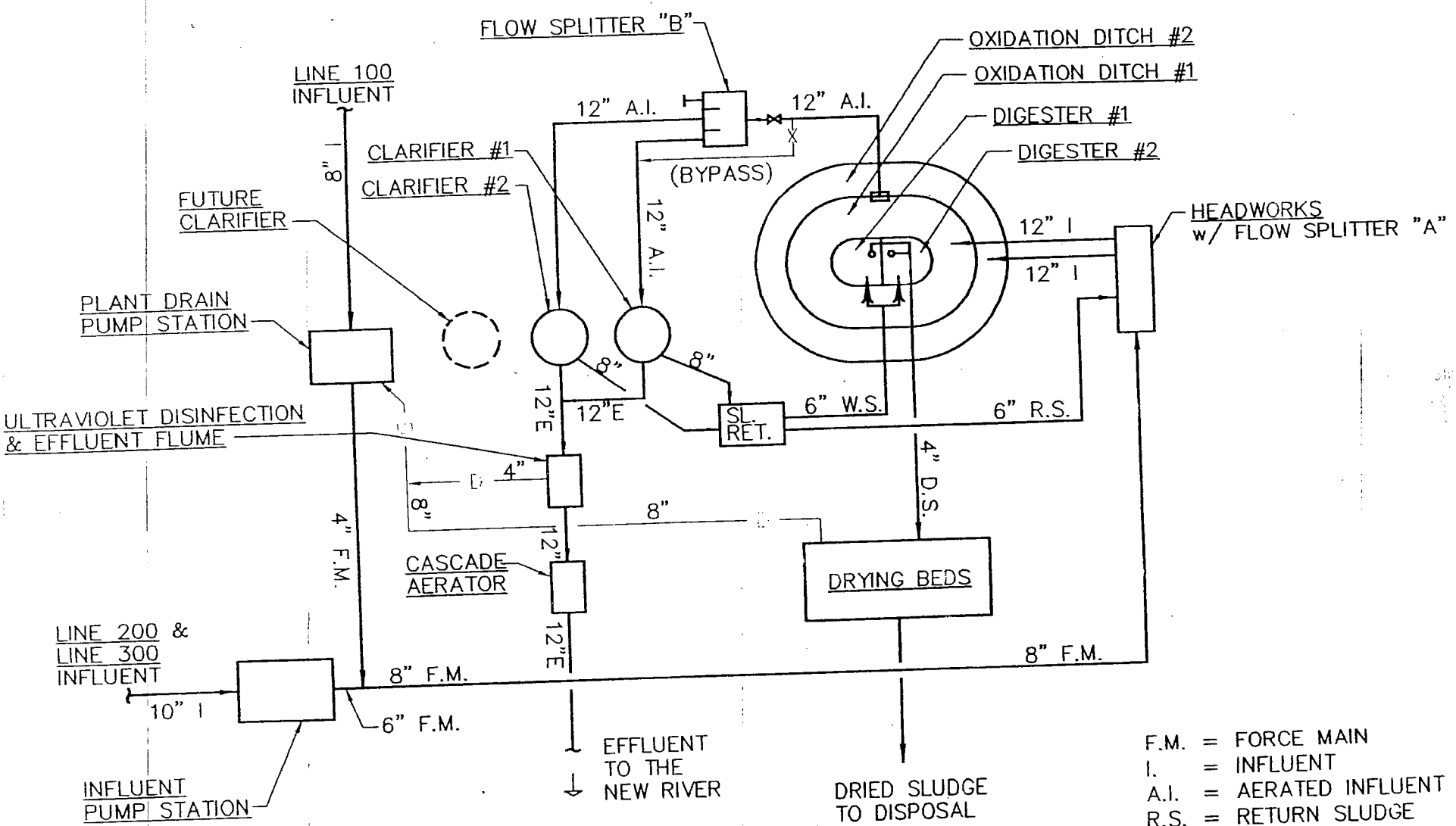
	A	B	C	D	E	F	G	H	I	J	K	L	M
1													
2													
3													
4													
5													
6	Reference Gauge (data from 1940 to 1976)							**Flow frequencies for the reissued permit (12/29/08)**					
7	New River at Eggleston, VA (#03171500)							**New River at Discharge Point**					
8		Drainage Area [mi^2] =		2,941					**Drainage Area [mi^2] =**		**3,035**		
9		ft^3/s	MGD		ft^3/s	MGD			**ft^3/s**	**MGD**		**ft^3/s**	**MGD**
10	1Q10 =	703	454	High Flow 1Q10 =	959	620		**1Q10 =**	**633**	**409**	**High Flow 1Q10 =**	**934**	**604**
11	7Q10 =	930	601	High Flow 7Q10 =	1,285	830		**7Q10 =**	**796**	**514**	**High Flow 7Q10 =**	**1,302**	**842**
12	30Q5 =	1,221	789	HM =	2,575	1,664		**30Q5 =**	**1,133**	**732**	**HM =**	**2,501**	**1,616**
13	30Q10=	1,095	708					**30Q10=**	**990**	**640**			
14													
15													
16	Reference Gauge (data from 1940 to 1976)							Solving for current flow at Eggleston (data from 1940 to Current)					
17	New River at Glen Lyn, VA (#03176500)							New River at Eggleston, VA (#03171500)					
18		Drainage Area [mi^2] =		3,768					Drainage Area [mi^2] =		2,941		
19		ft^3/s	MGD		ft^3/s	MGD			ft^3/s	MGD		ft^3/s	MGD
20	1Q10 =	1,001	647	High Flow 1Q10 =	1,250	808		1Q10 =	614	397	High Flow 1Q10 =	905	585
21	7Q10 =	1,218	787	High Flow 7Q10 =	1,629	1,053		7Q10 =	771	498	High Flow 7Q10 =	1,262	816
22	30Q5 =	1,490	963	HM =	3,188	2,060		30Q5 =	1,098	710	HM =	2,423	1,566
23	30Q10=	1,370	885					30Q10=	959	620			
24													
25													
26	Reference Gauge (data from 1940 to 2005)												
27	New River at Glen Lyn, VA (#03176500)												
28		Drainage Area [mi^2] =		3,768									
29		ft^3/s	MGD		ft^3/s	MGD							
30	1Q10 =	874	565	High Flow 1Q10 =	1,180	763							
31	7Q10 =	1,010	653	High Flow 7Q10 =	1,600	1,034							
32	30Q5 =	1,340	866	HM =	3,000	1,939							
33	30Q10=	1,200	776	Annual Average =	5,047	3,262							

SITEID	NAME	RECORD	LATLONG	DAAREA	HARMEAN	HF30Q10	HF7Q10	HF1Q10	Z30Q5	Z30Q10	Z7Q10	Z1Q10	Z1Q30	HFMTHS	Statperiod	Yrstrn	NOTES
03171500	New River at Eggleston, Va.	R, 1915-76	Lat 37 17'22", Long 80 37'00", NAD 83	2941	2575	1751	1285	959	1221	1095	930	703	-----	JAN-MAY	1940-1976	2005	Flow Regulated since 1939 by Claytor Reservoir
03176500	New River at Glen Lyn, Va.	R, 1927-	Lat 37 22'22", Long 80 51'38", NAD 83	3,768	3000	2160	1600	1180	1340	1200	1010	874	790	JAN-MAY	1940-2003	2005	Flow Regulated since 1939 by Claytor Reservoir

03176500

Attachment B

Wastewater Schematic

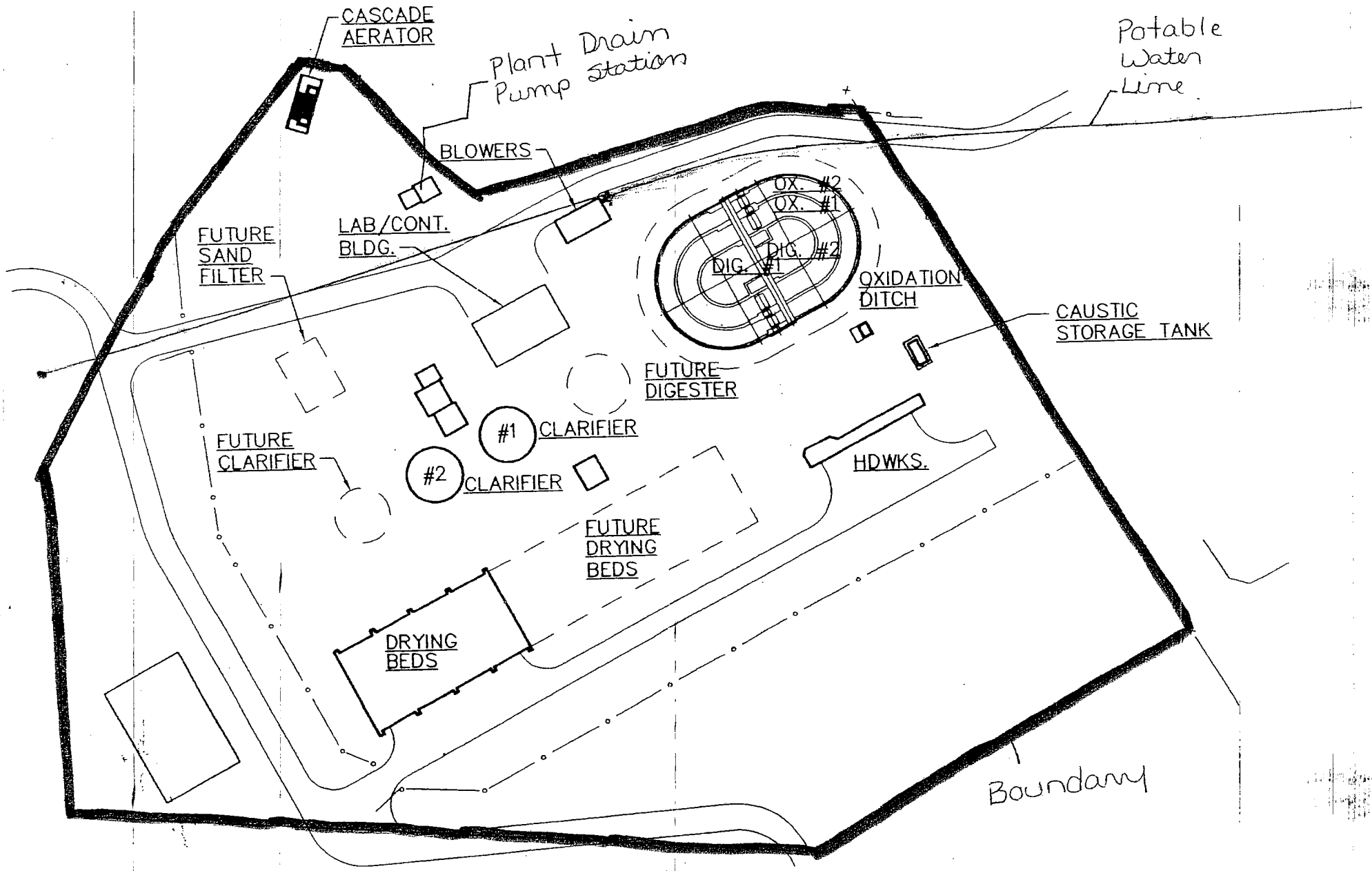


F.M. = FORCE MAIN
I. = INFLUENT
A.I. = AERATED INFLUENT
R.S. = RETURN SLUDGE
W.S. = WASTE SLUDGE
E. = EFFLUENT
D.S. = DIGESTED SLUDGE

PLANT FLOW SCHEMATIC

FIGURE 05000–1

N.T.S



SITE LAYOUT

04000-1 NTS

Attachment C

Site Inspection Report

MEMORANDUM

DEPARTMENT OF ENVIRONMENTAL QUALITY
West Central Regional Office

3019 Peters Creek Road Roanoke, VA 24019

SUBJECT: Site Inspection Report for Pembroke WWTP
Reissuance of VPDES Permit No. VA0088048

TO: Permit File

FROM: Becky L. France, Environmental Engineer Senior BLF

CC: Samuel C. Hale, Environmental Inspector Supervisor

DATE: August 6, 2008

On August 5, 2008, a site inspection of the Pembroke WWTP was conducted. Mr. Stanley Lucas, operator, was present at the inspection.

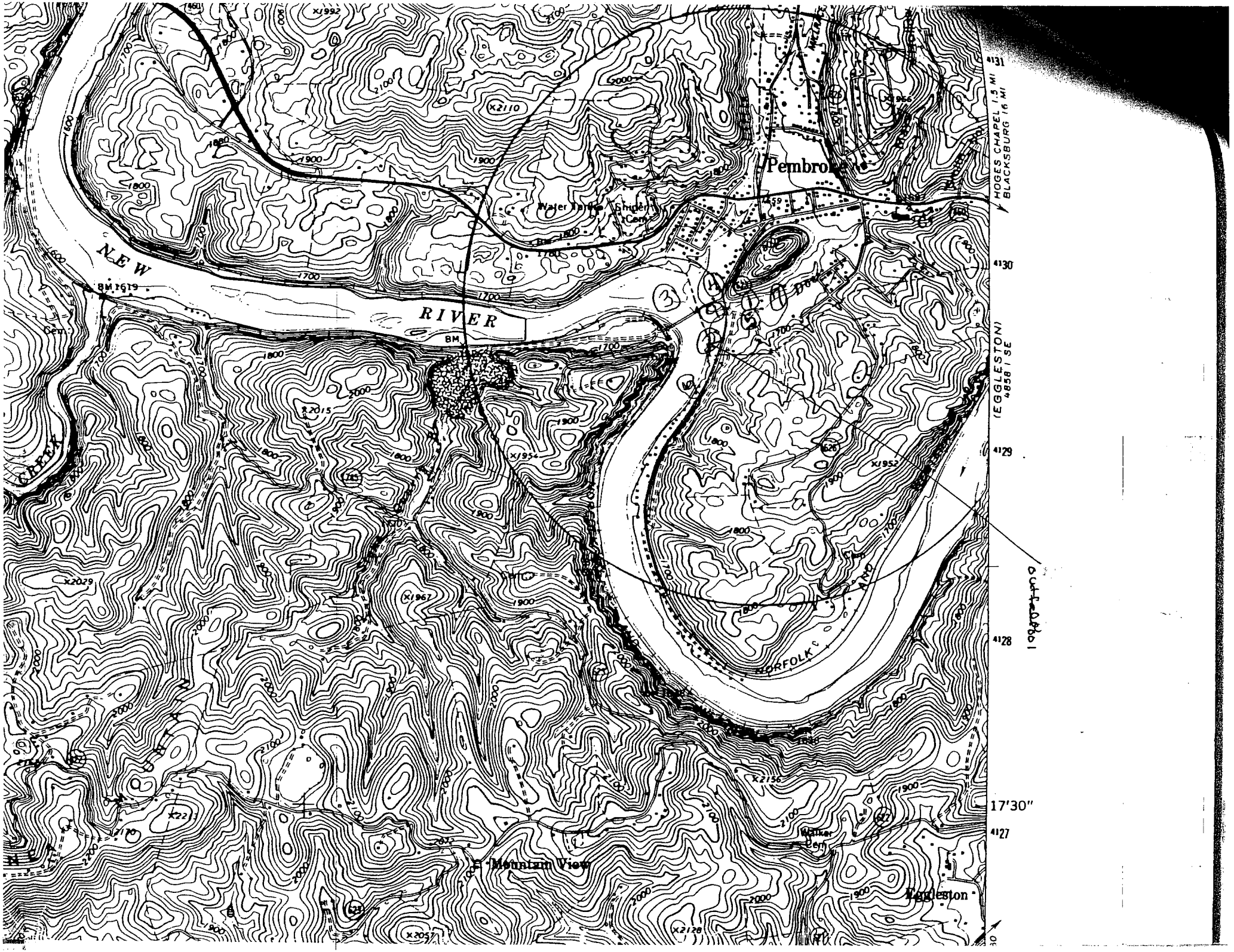
Pembroke WWTP consists of a comminutor, bar screen, grit chamber, two oxidation ditchs, two clarifiers, ultraviolent disinfection system, cascade aerator, two aerobic digestors, and sludge drying beds. The facility is currently operating only one of the oxidation ditches. This 0.20 MGD facility began operation in 1996.

Wastewater enters the plant from a 6-inch force main and flows through the comminutor chamber and manual bar screen channel. Then, the wastewater passes through a grit removal chamber. Grit is removed to a sump for dewatering. At the time of the site visit, the grit chamber was not operational. The wastewater then flows to an oxidation ditch which is aerated by an aeration rotor assembly. Due to low effluent flows, only the inner oxidation ditch is currently used. At the time of the site visit, the wastewater had a chocolate color. From the oxidation ditch the wastewater entered two parallel clarifiers. There were no visible solids being carried over the weir. From the clarifier, the wastewater overflows the weir and is routed to one of the two ultraviolent light banks. Disinfected effluent flows through a trough into a cascade aerator and is discharged into the New River. A flowmeter continuously records effluent flow within a Parshall flume which is located at the end of the trough. At the time of the site visit, the cascade steps were clean, and the effluent appeared clear.

Sludge that is collected in the clarifiers is periodically pumped to the aerated aerobic digesters. The digesters' coarse bubble air diffuser system operates on a timer. Sludge is removed from the digesters by sludge pumps and transferred to the four sludge drying beds. A blanket of sludge is applied to the covered sludge drying beds. Underdrainage from the sludge drying beds and decant from the sludge digester are returned to the oxidation ditch. The caked sludge, which should be at least 20 percent solids, is removed and disposed of in a landfill. According to Mr. Lucas, sludge is currently being hauled to the landfill about every 21 days. During the winter, sludge may be hauled approximately every 28 to 31 days.

Attachment D

US Topographic Map


NEW
RIVER
Pembroke
Water Tank
Cem.
BM 1619
BM
Cem.
CREEK
Cem.
NORFOLK
Mountain View
Eggleston
Walker Cem.
HOGES CHAPEL 1.3 MI
BLACKSBURG 16 MI
(EGGLESTON)
4858 I SE
17'30"
4131
4130
4129
4128
4127

Attachment E

Ambient Water Quality Information

- STORET Data (Station 9-NEW030.15)
- STORET Data (Station 9-NEW056.22)
- 2006 Impaired Waters Summary (Excerpt)
- 1976 New River Basin Comprehensive Water Resources Plan (Excerpt)

VAW-N29R
STORET Station 9-NEW030.15

New River Dissolved Metals Data (ug/l)

Collection Date Time	As	Cd	Cr	Cu	Fe	Pb	Mn	Tl	Ni	Ag	Zn	Sb	Al	Se	Hg-TL filtered, ultrace metal method NG/L	Hg
10/23/1997 13:00	0.68	<0.1	0.17	1	<10	<0.1	3.4	<0.1	0.44	<0.1	<1	<0.1	3.4	<0.5		<0.2
6/26/2001 10:00					<50	U		<0.2	U						<1.5	

VAW-N29R
STORET Station 9-NEW030.15

New River PCB Data

Collection Date Time	PCBs Total, Sediment (ug/kg dry wt.)
7/16/1996 12:35	30U
7/9/1997 12:20	30U
8/12/1998 14:05	100
5/24/2000 11:10	80J

U= Indicates material was analyzed for but not above detection
J=Estimated Value

VAW-N29R
9-NEW030.15

Collection Date Time	Do Probe	Field pH (S.U)	E. coli - MTEC-MF No/100ML
1/26/2000 11:00	13.8	6.86	
2/14/2000 11:25	12.1	7.38	
3/29/2000 10:20	11.3	7.86	
4/6/2000 11:40	10.4	7.77	
5/24/2000 11:05	8.5	7.86	
5/24/2000 11:10	8.5	7.86	
6/26/2000 11:30	8.6	8.6	
7/25/2000 10:00	7.5	7.89	
8/29/2000 12:00	7.8	8.24	
9/26/2000 11:00	7.1	7.95	
10/11/2000 12:00	11.4	8.59	
11/20/2000 10:40	13.5	8.58	
12/20/2000 10:00	13.3	7.33	
1/30/2001 8:20	11.73	8.39	
2/21/2001 12:50	12.8	8.51	
3/15/2001 11:00	10.03	8.22	
4/16/2001 13:10	9.5	8.66	
5/8/2001 12:45	9.09	8.52	
6/21/2001 14:30	9.79	8.83	
7/17/2001 14:00	8.16	8.64	
8/15/2001 10:00	6.57	8.08	
9/11/2001 14:20	9.03	8.76	
10/25/2001 11:00	8.77	8.72	
11/27/2001 9:10	9.22	8.82	
12/18/2001 11:10	10.08	8.11	
2/25/2002 11:15	11.13	8.15	
3/14/2002 10:55	11.82	7.65	
4/29/2002 13:30	9.6	8.15	
5/30/2002 12:30	8.62	8.42	
6/25/2002 11:45	8.69	8.75	
7/30/2002 9:00	6.01	7.52	
8/21/2002 10:55	6.93	8.14	
9/24/2002 13:20	7.55	8.28	
10/28/2002 14:20	9.47	8.21	
11/21/2002 9:30	9.71	7.58	
12/12/2002 10:00	11.39	7.45	
1/22/2003 11:30	12.2	7.63	
2/11/2003 11:15	11.81	8.61	
3/13/2003 14:30	11.17	7.67	
4/10/2003 11:45	10.06	7.96	
6/12/2003 11:30	7.8	7.74	
8/14/2003 11:45	7.24	7.74	240
10/29/2003 15:15	10.04	7.85	10U
12/16/2003 10:10	10.93	6.57	50

VAW-N29R
9-NEW030.15

Collection Date Time	Do Probe	Field pH (S.U)	E. coli - MTEC-MF No/100ML
2/12/2004 10:25	11.96	8.17	40
4/27/2004 10:00	9.28	8.12	800L
6/15/2004 9:30	7.26	7.65	80
8/25/2004 11:00	8.3	8.2	25U
10/26/2004 11:40	8.3	7.81	120
12/16/2004 10:40	11.51	7.86	25
2/15/2005 11:40	NULL	7.63	25
4/13/2005 10:25	9.85	7.75	50
6/14/2005 10:30	7.8	7.8	25U
8/15/2005 10:15	7	8.4	25U
10/18/2005 11:00	NULL	8.04	25U
12/13/2005 10:45	11.3	6.8	25U
2/9/2006 9:30	13	8.1	25U
4/11/2006 10:10	9.9	7.4	25
6/20/2006 9:50	NULL	NULL	50
8/15/2006 10:45	6.6	8	25U
10/2/2006 14:35	9.9	NULL	25
12/11/2006 11:25	NULL	8.1	25U
1/18/2007 11:00	10.6	8.2	25U
3/27/2007 11:50	10.4	7.1	25
5/17/2007 10:50	9.7	7.7	25U
7/11/2007 11:35	6.7	8	50
9/11/2007 11:30	7.2	8	25U
11/28/2007 11:00	13.4	7.5	25U
1/15/2008 13:05	13	7.9	25
3/25/2008 12:35	12.7	7.9	25U
5/20/2008 12:15	9.7	8.1	620
7/9/2008 12:20	7.8	7.4	75

90th Percentile pH **8.6** **S.U.**
10th Percentile pH **7.4** **S.U.**

VAW-N29R
9-NEW030.15

Collection Date Time	Hardness, Total (mg/L as $CaCO_3$)
1/28/1999 10:45	54
2/10/1999 10:45	60
3/30/1999 12:40	70
4/26/1999 11:10	78
5/10/1999 10:50	60
6/22/1999 11:10	71
7/26/1999 12:00	78.4
8/17/1999 11:20	87.2
9/21/1999 11:30	80.9
10/13/1999 10:40	75.2
11/16/1999 11:30	66.7
12/14/1999 9:30	64.1
1/26/2000 11:00	72.3
2/14/2000 11:25	52.5
3/29/2000 10:20	59
4/6/2000 11:40	47
5/24/2000 11:05	63
6/26/2000 11:30	75.4
7/25/2000 10:00	72.4
8/29/2000 12:00	80
9/26/2000 11:00	82
10/11/2000 12:00	87.1
11/20/2000 10:40	82.6
12/20/2000 10:00	58.9
1/30/2001 8:20	82
2/21/2001 12:50	56.4
3/15/2001 11:00	45
4/16/2001 13:10	30.3
5/8/2001 12:45	61.4
6/21/2001 14:30	61.1
7/17/2001 14:00	98.9
8/15/2001 10:00	69.2
9/11/2001 14:20	43.4
10/25/2001 11:00	60.6
11/27/2001 9:10	57.9
12/18/2001 11:10	68.2
2/25/2002 11:15	36
3/14/2002 10:55	75.5
4/29/2002 13:30	65.9
5/30/2002 12:30	77.3
6/25/2002 11:45	96.9
7/30/2002 9:00	88.7
8/21/2002 10:55	91.3
9/24/2002 13:20	54.4
10/28/2002 14:20	78.2
11/21/2002 9:30	50.5
12/12/2002 10:00	55.3
1/22/2003 11:30	84.5
2/11/2003 11:15	75.1
3/13/2003 14:30	67.5
4/10/2003 11:45	54.9
6/12/2003 11:30	63.1

1/23/02	10U	not used in data set
1/23/02	306.3	considered outliers

Mean Hardness	**67.8**	**mg/L**

VAW-N23R
9-NEW056.22 Route 730 Bridge at Eggleston Gauge (Above Celanese Plant)

Collection Date Time	Temp Celsius
1/28/1999 12:45	8
2/10/1999 12:30	8
3/30/1999 13:20	11.8
4/26/1999 12:00	12.8
5/10/1999 12:10	17.3
6/22/1999 12:00	20.9
7/26/1999 12:45	25.9
8/17/1999 12:30	26.3
9/21/1999 12:30	16.5
10/13/1999 11:30	18.4
11/16/1999 12:20	9
1/26/2000 11:50	0.7
2/14/2000 12:30	4.6
3/29/2000 9:20	7.2
4/6/2000 12:50	13.1
5/24/2000 12:30	19.5
5/24/2000 12:35	19.5
6/26/2000 12:15	25.4
7/25/2000 8:25	20
8/29/2000 11:10	22.4
9/26/2000 8:30	17.5
10/11/2000 11:00	12
11/20/2000 8:00	4.1
12/20/2000 9:00	0.8
1/30/2001 11:30	5.4
2/21/2001 12:00	8
3/15/2001 8:20	8.4
4/16/2001 12:20	11.9
5/8/2001 14:15	16.8
6/21/2001 13:00	23.1
8/15/2001 8:50	22
10/25/2001 9:30	15.9
12/18/2001 9:50	8.7
2/25/2002 9:30	4.8
4/29/2002 14:00	15.66
6/25/2002 13:05	28.26
8/21/2002 11:20	25.92
10/28/2002 15:00	15
12/12/2002 11:30	5.54
2/11/2003 12:20	3.4
4/10/2003 12:30	9.7
6/12/2003 12:25	19.56
1/18/2007 12:00	4.6
3/27/2007 12:30	13.8
5/17/2007 12:15	17.2
7/11/2007 13:05	24.8
9/11/2007 13:05	24
11/28/2007 12:20	8.3
1/15/2008 13:50	4.7
3/25/2008 13:10	8.6
5/20/2008 13:00	16.2
7/9/2008 14:00	24.1

90th percentile temperature	24.7 °C
90th percentile temperature (Jan. - May)	17.3 °C

2006 Impaired Waters

Categories 4 and 5 by Cause Group Code

VIRGINIA DEPARTMENT OF ENVIRONMENTAL QUALITY

New River Basin

Cause Group ID: **N29R-01-PCB** **New River, Claytor Lake, Peak Creek and Reed Creek**

2006 TMDL Group Codes: 30001

Location: The impairment begins at the I-77 bridge crossing the New River and extends downstream to the VA/WVA State Line and includes the tributaries Peak Creek and Reed Creek as described below.

Note: The original VDH Advisory issued 8/06/01 extends from Claytor Dam (modified 8/06/03) on the New River on downstream to the VA / WVA State Line. The original VDH Advisory spans the Radford North, Eggleston, Pearisburg, Narrows and Peterstown, WVA Quads.
The expansion of the VDH Advisory issued 12/13/2004 extends from the the I-77 bridge (Wythe County) downstream to Claytor Dam to include the tributaries Peak Creek upstream to the confluence with North Fork Peak Creek (Tract Fork) in Pulaski. And Reed Creek upstream to the confluence with Miller Creek near Rt. 121 bridge near Max Meadows.

City / County: Giles Co Montgomery Cc Pulaski Co Radford City

Use(s): Fish Consumption

Cause(s) / VA Category: PCB in Fish Tissue / 5A PCB in Fish Tissue / 5D

The Virginia Department of Health (VDH) issued a fish consumption advisory on August 6, 2001 for polychlorinated biphenyls (PCBs) for the lower portion of the New River (Rt. 114 Bridge downstream to the VA / WVA State Line -52.08 miles) based on fish tissue collections from Carp. An Advisory extension on 8/06/2003 to Claytor dam on 8/06/2003 (11.51 miles) reccommends that no carp be consumed in these waters and no more than two meals per month of flathead and channel catfish. The VDH PCB Fish Consumption Advisory was further extended upstream on the New River (__ miles) to the I-77 Bridge to include the lower portions of Peak Creek (4.95 miles), Reed Creek (__ miles) and Claytor Lake (4,287 acres) on 12/02/2004. The VDH advises consumption should not exceed two meals per month for carp and smallmouth bass. The VDH level of concern is 50 parts per billion (ppb) in fish tissue.

There are eight fish tissue collection sites within the 2006 data window reporting exceedences of the WQS based 54 ppb fish tissue value (TV). These data are reviewed by the VDH in making an advisory determination. A complete listing of collection sites and associated fish tissue data are available at http://www.deq.virginia.gov/fishtissue/fishtissue.html. A more detailed presentation of the data can also be found using an interactive mapping application at http://gisweb.deq.state.va.us/. The VDH Advisory information is also available via the web at http://www.vdh.virginia.gov/Epidemiology/PublicHealthToxicology/Advisories/.

Assessment Unit / Water Name / Description	Cause Category / Name	Cycle First Listed	TMDL Schedule	Size
VAW-N16L_NEW01A02 / Claytor Lake Lower (New River) / Claytor Lake from its impounding structure upstream to the former Burlington Industries intake.	5A PCB in Fish Tissue	2006	2018	1,803.55
VAW-N16L_NEW02A02 / Claytor Lake Middle 1 (New River) PWS / Claytor Lake from the former Burlington Industries intake upstream to the confluence of Peak Creek	5A PCB in Fish Tissue	2006	2018	242.06
VAW-N16L_NEW03A02 / Claytor Lake Middle 2 (New River) PWS / Claytor Lake from the confluence of Peak Creek upstream to the end of the WQS public water supply (PWS) designation. The segment ends five miles upstream of the former Burlington Industries intake.	5A PCB in Fish Tissue	2006	2018	704.08

2006 Impaired Waters

Categories 4 and 5 by Cause Group Code

VIRGINIA DEPARTMENT OF ENVIRONMENTAL QUALITY

New River Basin

Assessment Unit / Water Name / Description	Cause	Category / Name	Cycle First Listed	TMDL Schedule	Size
VAW-N16L_NEW04A02 / Claytor Lake Middle 3 (New River) PWS / Claytor Lake from the end of the Burlington WQS public water supply (PWS) designation upstream to the Pulaski County PSA intake.	5A	PCB in Fish Tissue	2006	2018	435.57
VAW-N16L_NEW05A02 / Claytor Lake Upper 1 (New River) PWS / Claytor Lake from the Pulaski County PSA intake upstream to the end of the WQS public water supply (PWS) designation. Five miles upstream from the Pulaski County PSA intake.	5A	PCB in Fish Tissue	2006	2018	660.28
VAW-N16L_NEW06A02 / Claytor Lake Upper 2 (New River) Non PWS / Claytor Lake from the upstream end of the Pulaski County PSA WQS public water supply (PWS) designation upstream to the backwaters of Claytor Lake at Allisonia.	5A	PCB in Fish Tissue	2006	2018	146.65
VAW-N16L_PKC01A02 / Claytor Lake - Peak Creek Lower / Peak Creek from its confluence with the New River upstream to the end of the WQS public water supply (PWS) designation.	5A	PCB in Fish Tissue	2002	2014	216.87
VAW-N16L_PKC02A02 / Claytor Lake - Peak Creek Upper / Peak Creek from the end of the WQS public water supply (PWS) designation upstream to its backwaters.	5A	PCB in Fish Tissue	2002	2014	77.74
VAW-N16R_NEW01A00 / New River Upper (Allisonia) / This section of the New River extends from the mouth of Big Reed Island Creek downstream to the backwaters of Claytor Lake.	5A	PCB in Fish Tissue	2006	2018	0.81
VAW-N17R_PKC01A00 / Peak Creek Lower / This portion of Peak Creek begins just downstream of the Rt. 99/Norfolk Southern crossing extending downstream to the inundation of Peak Creek in Claytor Lake.	5D	PCB in Fish Tissue	2002	2014	2.84
VAW-N17R_PKC02A00 / Peak Creek Middle 1 / The segment begins downstream of the Washington Ave. Bridge (~0.20 miles) and extends on downstream to just below the Rt. 99 Bridge/Norfolk Southern Railway crossing of Peak Creek.	5D	PCB in Fish Tissue	2002	2014	1.62
VAW-N17R_PKC03A00 / Peak Creek Middle 2 / This portion of Peak Creek extends from the mouth of Tract Fork to downstream of the Washington Ave. Bridge (~0.20 miles).	5D	PCB in Fish Tissue	2006	2014	0.49
VAW-N18R_NEW01A00 / New River Lower / New River mainstem from the Watershed boundary, Crab Creek mouth, upstream to approximatley one mile downstream of the Rt. 11 Bridge; end of the WQS public water supply (PWS) section.	5A	PCB in Fish Tissue	2006	2018	3.27
VAW-N18R_NEW02A00 / New River Middle / New River mainstem from approximately one mile downstream of the Rt. 11 Bridge upstream to the Radford City intake.	5A	PCB in Fish Tissue	2006	2018	3.73
VAW-N18R_NEW03A00 / New River Upper 1 / New River mainstem from the City of Radford water intake upstream to the confluence of Little River.	5A	PCB in Fish Tissue	2006	2018	2.12

2006 Impaired Waters

Categories 4 and 5 by Cause Group Code

VIRGINIA DEPARTMENT OF ENVIRONMENTAL QUALITY

New River Basin

Assessment Unit / Water Name / Description	Cause	Category / Name	Cycle First Listed	TMDL Schedule	Size
VAW-N18R_NEW04A00 / New River Claytor Dam / New River mainstem waters from the mouth of Little River upstream to Claytor Dam.	5A	PCB in Fish Tissue	2006	2018	0.66
VAW-N22R_NEW01A00 / New River Lower 1 / The New River mainstem from the confluence of Back Creek downstream to the Watershed Boundary at the Montgomery / Giles County Line.	5A	PCB in Fish Tissue	2002	2014	3.44
VAW-N22R_NEW02A00 / New River Lower 2 / New River mainstem from the Radford Army Arsenal Plant downstream intake near Whitethorne downstream to the confluence of Back Creek.	5A	PCB in Fish Tissue	2002	2014	2.89
VAW-N22R_NEW03A00 / New River Middle 1 / New River mainstem from the confluence of Stroubles Creek downstream to the Radford Army Arsenal Plant downstream water intake near Whitethorne.	5A	PCB in Fish Tissue	2002	2014	4.51
VAW-N22R_NEW04A00 / New River Middle 2 / New River mainstem from the Radford Army Arsenal Plant upstream intake/Pepper's Ferry Region POTW outfall downstream to the confluence of Stroubles Creek.	5A	PCB in Fish Tissue	2002	2014	2.35
VAW-N22R_NEW05A00 / New River Upper / New River mainstem from the Blacksburg /Christiansburg /VPI Authorty intake at Rt. 114 downstream to the Radford Army Arsenal Plant upstream intake / Pepper's Ferry Regional POTW outfall.	5A	PCB in Fish Tissue	2002	2014	1.78
VAW-N22R_NEW06A00 / New River Upper 2 / New River mainstem from the Watershed Boundary at the Crab Creek confluence downstream to the Blacksburg /Christiansburg /VPI Authorty intake.	5A	PCB in Fish Tissue	2006	2018	1.73
VAW-N23R_NEW01A00 / New River / New River mainstem from the Giles/Montgomery County Line downstream to the confluence of Sinking Creek.	5A	PCB in Fish Tissue	2002	2014	5.52
VAW-N24R_NEW01A00 / New River Lower 1 / New River mainstem from the confluence of Stony Creek upstream to the mouth of Walker Creek on the New River.	5A	PCB in Fish Tissue	2002	2014	3.81
VAW-N24R_NEW02A00 / New River Lower 2 / New River mainstem waters from the mouth of Walker Creek upstream to the confluence of Little Stony Creek with the New River.	5A	PCB in Fish Tissue	2002	2014	1.95
VAW-N24R_NEW03A00 / New River Middle / New River mainstem waters from the confluence of Little Stony Creek upstream to mouth of Sinking Creek on the New River.	5A	PCB in Fish Tissue	2002	2014	3.86
VAW-N29R_NEW01A02 / New River Lower / New River mainstem from the backwaters of Bluestone Reservoir, Route 460, to the confluence of Rich Creek.	5A	PCB in Fish Tissue	2002	2014	3.14

2006 Impaired Waters

Categories 4 and 5 by Cause Group Code

VIRGINIA DEPARTMENT OF ENVIRONMENTAL QUALITY

New River Basin

Assessment Unit / Water Name / Description	Cause	Category / Name	Cycle First Listed	TMDL Schedule	Size
VAW-N29R_NEW02A02 / New River Middle 1 / New River mainstem from the mouth of Rich Creek upstream to the confluence of Wolf Creek.	5A	PCB in Fish Tissue	2002	2014	3.53
VAW-N29R_NEW03A02 / New River Middle 2 / New River mainstem from the confluence of Wolf Creek upstream to the Celanese Acetate Plant outfalls.	5A	PCB in Fish Tissue	2002	2014	2.79
VAW-N29R_NEW04A02 / New River Upper / New River mainstem from the Celeanse Acetate Plant outfalls upstream to the watershed boundary at the confluence of Stony Creek.	5A	PCB in Fish Tissue	2002	2014	5.66
VAW-N35R_NEW01A00 / New River / New River mainstem from the Rt. 460 Bridge at Glen Lyn downstream to the Virginia/West Virginia State Line.	5A	PCB in Fish Tissue	2002	2014	6.85

New River, Claytor Lake, Peak Creek and Reed Creek	Estuary (Sq. Miles)	Reservoir (Acres)	River (Miles)
PCB in Fish Tissue - Total Impaired Size by Water Type:		4,286.80	69.35

Sources:

Source Unknown

2006 Impaired Waters

Categories 4 and 5 by Impaired Area ID

VIRGINIA DEPARTMENT OF ENVIRONMENTAL QUALITY

New River Basin

Cause Group ID: **N24R-01-DDE** **New River**

2006 TMDL Group Codes: 00530

Location: New River mainstem waters from the confluence of Sinking Creek downstream the mouth of Stony Creek.

City / County: Giles Co

Use(s): Fish Consumption

Cause(s) / VA Category: DDE / 5A

9-NEW050.70 (New River near Pembroke) 2001 fish tissue collection - Two Carp exceed the WQS based Tissue Value (TV) for DDE of 320 ppb at 355 and 326 ppb from two Carp analyzed. Formerly Listed VAW-N22R-01 for DDE 2004.

Assessment Unit / Water Name / Description	Cause Category / Name	Cycle First Listed	TMDL Schedule	Size
VAW-N24R_NEW01A00 / New River Lower 1 / New River mainstem from the confluence of Stony Creek upstream to the mouth of Walker Creek on the New River.	5A DDE	2004	2016	3.81
VAW-N24R_NEW02A00 / New River Lower 2 / New River mainstem waters from the mouth of Walker Creek upstream to the confluence of Little Stony Creek with the New River.	5A DDE	2004	2016	1.95
VAW-N24R_NEW03A00 / New River Middle / New River mainstem waters from the confluence of Little Stony Creek upstream to mouth of Sinking Creek on the New River.	5A DDE	2004	2016	3.86

New River	Estuary (Sq. Miles)	Reservoir (Acres)	River (Miles)
DDE - Total Impaired Size by Water Type:			9.62

Sources:

Source Unknown

2006 Impaired Waters

Categories 4 and 5 by Impaired Area ID

VIRGINIA DEPARTMENT OF ENVIRONMENTAL QUALITY

New River Basin

Cause Group ID: **N24R-01-DDT** **New River**

2006 TMDL Group Codes: 00535

Location: New River mainstem waters from the confluence of Sinking Creek downstream the mouth of Stony Creek.

City / County: Giles Co

Use(s): Fish Consumption

Cause(s) / VA Category: DDT / 5A

9-NEW050.70 (New River near Pembroke) 2001 fish tissue collection- Two Carp exceed the WQS based Tissue Value (TV) for DDT of 320 ppb at 359 and 373 ppb from two Carp analyzed. Formerly Listed VAW-N22R-01 for DDT 2004.

Assessment Unit / Water Name / Description	Cause Category / Name	Cycle First Listed	TMDL Schedule	Size
VAW-N24R_NEW01A00 / New River Lower 1 / New River mainstem from the confluence of Stony Creek upstream to the mouth of Walker Creek on the New River.	5A DDT	2004	2016	3.81
VAW-N24R_NEW02A00 / New River Lower 2 / New River mainstem waters from the mouth of Walker Creek upstream to the confluence of Little Stony Creek with the New River.	5A DDT	2004	2016	1.95
VAW-N24R_NEW03A00 / New River Middle / New River mainstem waters from the confluence of Little Stony Creek upstream to mouth of Sinking Creek on the New River.	5A DDT	2004	2016	3.86

New River

	Estuary (Sq. Miles)	Reservoir (Acres)	River (Miles)
DDT - Total Impaired Size by Water Type:			9.62

Sources:

Source Unknown

VIRGINIA DEPARTMENT OF ENVIRONMENTAL QUALITY

2006 Impaired Waters

Categories 4 and 5 by Impaired Area ID

New River Basin

Cause Group ID: **N24R-01-HEPOXIDE New River**

2006 TMDL Group Codes: 50000

Location: New River mainstem waters from the confluence of Sinking Creek downstream the mouth of Stony Creek.

City / County: Giles Co

Use(s): Fish Consumption

Cause(s) / VA Category: Heptachlor epoxide / 5A

9-NEW050.70 (New River near Pembroke) 2001 fish tissue collection- Two Carp exceed the WQS based Tissue Value (TV) for heptachlor epoxide of 10 ppb at 54 ppb each from two Carp analyzed. Heptachlor epoxide moved from Risk based to WQS TV based with 2006 IR.

Assessment Unit / Water Name / Description	Cause Category / Name	Cycle First Listed	TMDL Schedule	Size
VAW-N24R_NEW01A00 / New River Lower 1 / New River mainstem from the confluence of Stony Creek upstream to the mouth of Walker Creek on the New River.	5A Heptachlor epoxide	2006	2018	3.81
VAW-N24R_NEW02A00 / New River Lower 2 / New River mainstem waters from the mouth of Walker Creek upstream to the confluence of Little Stony Creek with the New River.	5A Heptachlor epoxide	2006	2018	1.95
VAW-N24R_NEW03A00 / New River Middle / New River mainstem waters from the confluence of Little Stony Creek upstream to mouth of Sinking Creek on the New River.	5A Heptachlor epoxide	2006	2018	3.86

New River	Estuary (Sq. Miles)	Reservoir (Acres)	River (Miles)
Heptachlor epoxide - Total Impaired Size by Water Type:			9.62

Sources:

Source Unknown

New River Basin

Cause Group ID: **N29R-01-BAC** **New River**

2006 TMDL Group Codes: 50302

Location: New River mainstem waters from the confluence of Wolf Creek downstream to the backwaters of Bluestone Reservoir.

City / County: Giles Co

Use(s): Recreation

Cause(s) / VA Category: Escherichia coli / 5A

The initial 2006 303(d) Listing of these waters is a result of escherichia coli (E.coli) excursions of the 235 cfu/100 ml instantaneous criterion resulting in a 13.52 mile impairment.

9-NEW030.15 (Route 460 Bridge at Glen Lyn) E.coli exceeds the instantaneous criterion in two of nine samples. Exceeding values are 240 and greater than 800 cfu/100 ml.

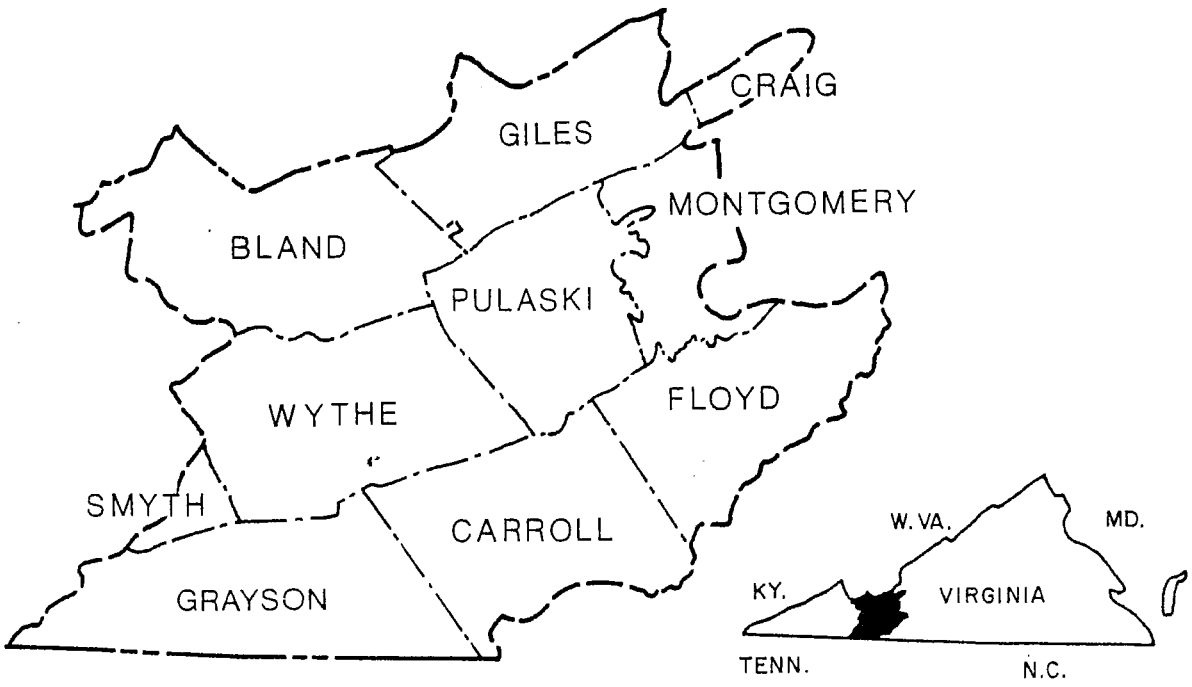
New River	Estuary (Sq. Miles)	Reservoir (Acres)	River (Miles)
Escherichia coli - Total Impaired Size by Water Type:			13.52

Sources:

Livestock (Grazing or Feeding Operations)	Municipal (Urbanized High Density Area)	On-site Treatment Systems (Septic Systems and Similar Decencentralized Systems)	Unspecified Domestic Waste
Wastes from Pets	Wildlife Other than Waterfowl		

STATE WATER CONTROL BOARD

NEW RIVER BASIN



COMPREHENSIVE WATER RESOURCES PLAN

VOLUME V-A

Part 2 of 3

RIVER BASIN WATER QUALITY MANAGEMENT PLAN

Planning Bulletin 205A

1976

VSWCB/PB/Q9/W-76/2

1. Incorporation of the community and implementation of the plan by the Town.

2. Formation of a board or authority to implement the plan.

3. Implementation of the plan by the Giles County Public Service Authority.

The Giles County Public Service Authority is the recommended implementing body. The authority would install, maintain, and operate the proposed system. A block diagram of the proposed facility is presented in Plate 65 and the sewer plan layout is presented in Plate 66.

Future Improvements. No future improvements will be needed if the selected alternative is implemented.

Receiving Stream Segment Classification. Sinking Creek is classified as follows:

Past Classification	Effluent Limitation
New Classification (Tables 13 & 14B)	Effluent (1974 through 1980)
	Effluent Limitation (1980 through 2020)

Pembroke Planning Area

Planning Area Description. (See Plate 12) The Pembroke Planning Area includes the Town of Pembroke and the area extending east of Pembroke along U. S. Route 460 to Hoges Chapel and north of the corporate limits along Virginia Route 623. The present population of 1,485 is projected to increase to 2,000 by 2020 (Table 28).

Existing Systems. Pembroke is presently served by septic tank-field line systems and cesspools. There are no existing central sewer facilities in the planning area.

Water Quality Problems. Stream assimilation modeling indicates that there are no BOD related water quality problems within the planning area (see Plate A-1, Appendix A).

The presence of sewage from improperly operating septic tank-drain field systems has created a situation which may be potentially dangerous to public health. It is doubtful that the existing systems that are functioning adequately can continue to do so throughout the study period. A more detailed study, such as the 201 Plan, is needed to evaluate the effect of septic tank systems on groundwater and surface water.

Degree of Treatment Required. Table 58 indicates that the maximum effluent BOD load for the Pembroke Planning Area is 62.5 pounds per day. Based on this effluent limit and the sanitary raw wasteloads projected in Chapter III, a treatment level of 87.5 percent BOD removal will be required in 2020.

The minimum treatment level required by the Virginia State Water Control Board is secondary treatment or 87.5 percent BOD removal. This level of treatment will be satisfactory through 2020.

Alternative Solutions. Based on per capita flows of 100 gallons per day in 2020, the design flow for the Pembroke Planning Area is

0.157 million gallons per day for 1974 and 0.350 million gallons per day in 2020. The BOD loading ranges from 303 pounds per day in 1974 to 500 pounds per day in 2020 (Table 58).

The "Logic Diagram for Determination of Selected Alternatives" described in Chapter IV and illustrated on Plate 11-A indicates that Route "C" should be used for further analysis of this planning area.

The following alternatives were considered for resolving water quality problems in the area:

Alternative 1. (M/R Plan Solution) Construction of a collection system and a 0.275 million gallon per day sewage treatment plant is recommended. This is the measure recommended by the New River Valley Water Quality Management Plan.

Alternative 2. Retention of the septic tank-field line systems.

Review and Testing of Alternatives. Alternative 1, construction of a sewage treatment plant has been evaluated in terms of cost-effectiveness and environmental impact.

Alternative 2, retention of the existing system, would not solve the potential health problem and would be counter to requirements of water quality control, therefore, its cost has not been included.

A cost estimate for Alternative 1 is presented in Table 217. Total project cost is $1,857,330, while monthly user cost is $8.20 per connection. Total present worth is $2,226,238.

TABLE 217

COST ESTIMATE
PEMBROKE PLANNING AREA

Alternative 1

(New Sewage System)

I.	CONSTRUCTION COST	$1,375,800
	1. 57,00 L.F. 8-inch Gravity Sewer	798,000
	2. 228 Manholes	79,800
	3. 400 Connections	120,000
	4. .275 MGD Sewage Treatment Plant	378,000
II.	RELATED COSTS (35%)	481,530
III.	TOTAL PROJECT COST	1,857,330
IV.	GRANT FUNDS (85%)	1,578,731
V.	AMOUNT FINANCED (15%)	278,599
VI.	ANNUAL BUDGET	39,360
	1. Debt Retirement (5% for 40 years)	16,236
	2. Reserve (10%)	1,623
	3. Maintenance & Operation	21,500
VII.	PRESENT WORTH	2,226,238
	1. Initial Cost	1,857,330
	2. Present Worth of Annual Maintenance & Operation	368,908
VIII.	AVERAGE COST PER CONNECTION (Initial)	
	1. Annual	98.40
	2. Monthly	8.20

The environmental score for this alternative is +1804 and is tabulated in Table 218. A detailed discussion of the scoring system is presented in Appendix C.

The proposed system could be implemented by the Town or the Giles County Public Service Authority.

Selected Plan. The selected plan for the Pembroke area is Alternative 1: construction of a 275,000 gallon per day sewage treatment plant and collection system which will serve residents inside the corporate limits of the Town of Pembroke, the area east of Pembroke to Hoges Chapel, and the area along Virginia Route 623, north of town. A cost estimate for the selected alternative is given in Table 217. The system will initially serve approximately 400 connections at a monthly cost per connection of $8.20. Total project cost for the facility is $1,857,330.

The treatment plant will be capable of removing 87.5 percent BOD. Initial flows should average 140,000 gallons per day. Wastewater effluent having an initial BOD loading of 35 pounds per day will be discharged into New River near rivermile 27.0. A block diagram of the proposed facilities is shown in Plate 67.

Implementation by the Town of Pembroke is recommended. A map showing proposed improvements is presented in Plate 68.

Future Improvements. Future extensions to this system are planned along Virginia Route 626, south of town, by 1990. The proposed 1990

TABLE 218

ENVIRONMENTAL IMPACT
PEMBROKE PLANNING AREA
NEW RIVER BASIN

IMPORTANCE	10 Surface Water	7 Ground Water	6 Fauna	5 Flora	5 Population	4 Land Use	4 Aesthetic	3 Odor	2 Noise	Subtotal	Final Total
ALTERNATIVE - CONSTRUCTION PHASE											
1*	-2	0	-1	-1	0	0	-2	0	-2	-43	-86
ALTERNATIVE - OPERATION PHASE											
1*	+6	+1	+2	0	-1	-1	-2	+1	-1	+63	+1890
ALTERNATIVE - NET TOTAL											
1*											+1804

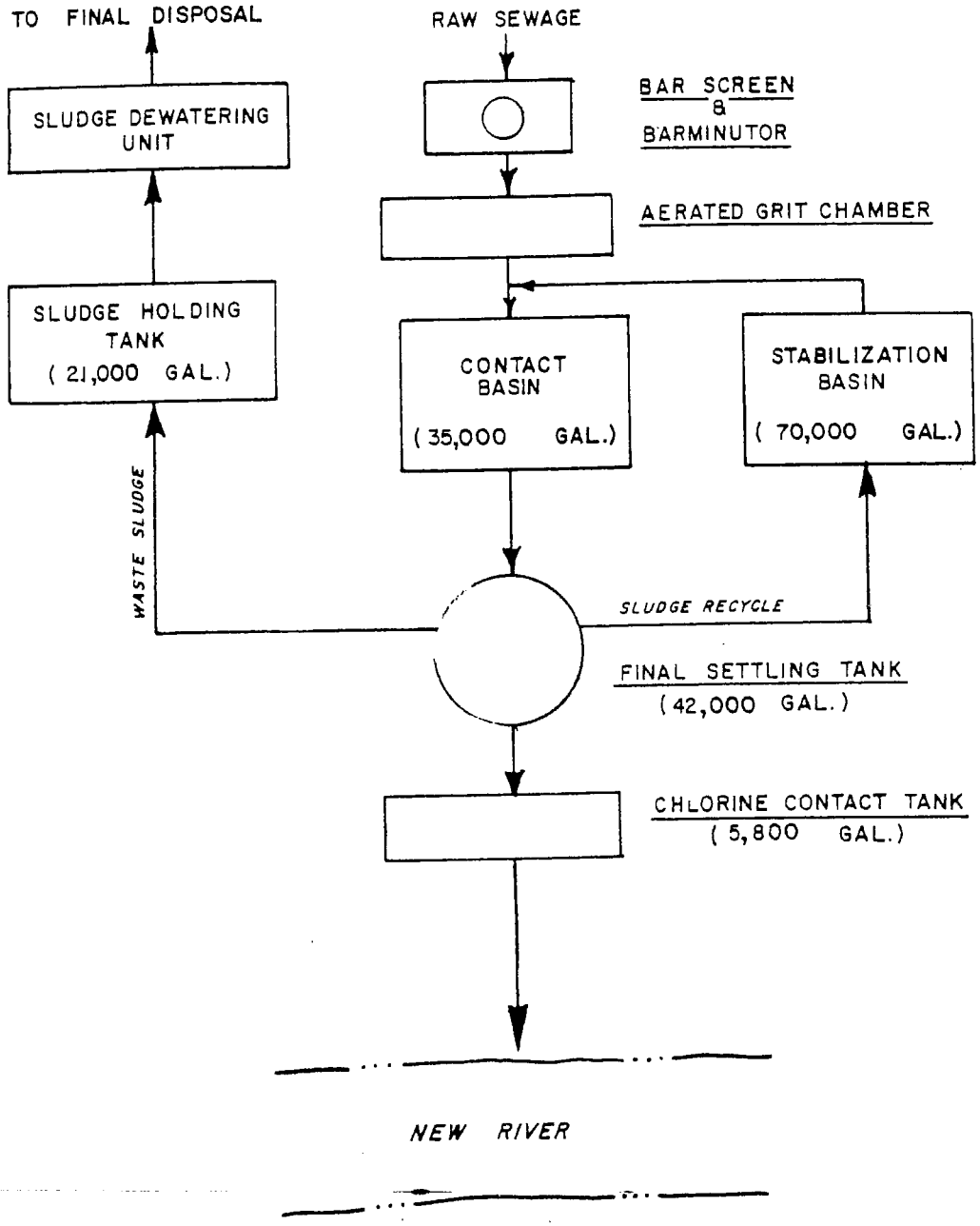
*Selected Alternative
Source: Thompson & Litton, Inc.

BLOCK DIAGRAM

PEMBROKE

PROPOSED SEWAGE TREATMENT PLANT

DESIGN CAPACITY-0.275 M.G.D.



SOURCE: THOMPSON & LITTON, INC.

PLATE No.67

417

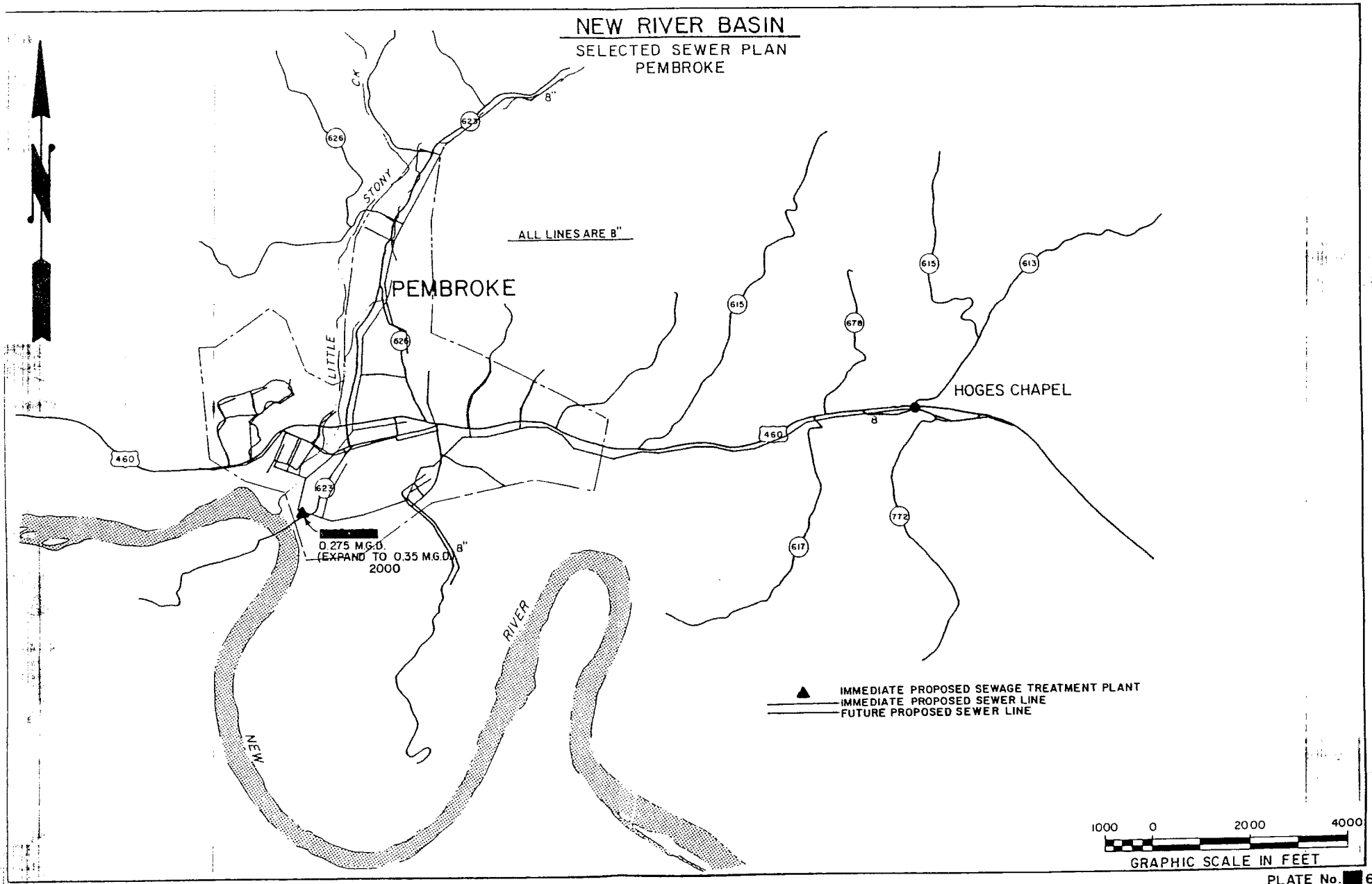


PLATE No. 68

SOURCE: THOMPSON & LITTON, INC.

extensions will serve an additional 35 connections at a total project cost of $140,000. A preliminary cost estimate is presented in Table 219.

Wasteflow projections indicate that an expansion of treatment facilities may be necessary around the year 2000. This expansion would be around 75,000 gallons per day if projections hold true. Further evaluation at a future date when the accuracy of the wasteflow projections can be better determined is recommended.

Receiving Stream Segment Classification. The New River is classified as follows:

Past Classification	Effluent Limitation
New Classification (Tables 12 & 147)	Effluent Limitation (1974 through 2020)

Bland Planning Area

Planning Area Description (see Plate 12). The Bland Planning Area includes the community of Bland and the surrounding area. The present population of 495 is projected to increase to 725 by 2020.

Existing Systems. There are no existing sewage treatment facilities in the planning area other than individual septic tank-drain field systems. It is estimated that approximately 90 percent of the population use the septic tank system. There are some areas, however, where sewage is disposed of by direct discharge to the stream or by the use of pit privies.

APPENDIX A

Stream Profiles

Introduction

The graphs in Appendix A show five-day biochemical oxygen demand (BOD_5), stream assimilation capacities, background BOD_5 from non-point pollution sources, and total present and projected BOD_5 loadings for receiving streams in the Basin through the year 2020.

A receiving stream BOD_5 assimilation capacity is the maximum total loading the stream can receive and still maintain stream standards for dissolved oxygen during 7-day-10-year low flow conditions. Stream assimilation capacity is shown on the profiles as the yellow line. Background loadings are shown in green and present total BOD_5 loadings in blue. Projected future total BOD_5 loadings for 1980, 2000, and 2020 are also shown. Where a present or future total BOD_5 loading curve crosses above the stream assimilation capacity (yellow curve), violations of dissolved oxygen standards for that stream are expected to occur during low flow conditions.

On some stream segments in the Basin, removing 100 percent of the point source loadings will still not achieve stream standards. Diffuse, domestic, and direct discharges outside the planning areas are the source of this problem. In areas where this was encountered, it was assumed that implementation of the NPDES permit program along with strict enforcement of direct discharge regulations by local and state

authorities will result in a 90 percent removal of these wasteloads. With this accomplished, the relationship between total stream loading and assimilation capacity was reassessed and loading reductions required beyond secondary treatment and BPT allocated among significant discharges when needed.

The total loading curves on these streams, therefore, reflect 10 percent diffuse loadings, non-point source background loadings, and secondary effluent loadings from point sources in the planning area. If assimilation capacity is still exceeded, allocation of reductions beyond secondary and BPT required to meet stream standards are proposed as part of the Basin Plan but are not shown on the curves.

Implementation of secondary treatment for all significant municipal point discharges and the BPT equivalent for industries was assumed for point discharges on all streams by 1980. Therefore, advanced waste treatment, zero discharge, or growth control methodologies must be employed for point discharges situated on segments where violations are shown from 1980 through 2020. In effect, this would bring all future total BOD_5 curves to levels below stream assimilation capacity.

When non-degradation standards as authorized in Section 62.1-44.4(2) of the State Water Control Board Law are applied to surface streams, the 1980 total BOD_5 curve is assumed as the limit for

Attachment F

Effluent Data

Pembroke WWTP (VA0088048)

Effluent pH (S.U.)

Date Due	min	max
10-Feb-04	6.6	7.3
10-Mar-04	6.6	8.2
10-Apr-04	6.6	7
10-May-04	6.7	7
10-Jun-04	6.8	7.2
10-Jul-04	6.9	7.1
10-Aug-04	6.9	7.5
10-Sep-04	6.8	7.6
10-Oct-04	6.7	7.2
10-Nov-04	6.6	7.2
10-Dec-04	6.7	7.1
10-Jan-05	6.7	7.4
10-Feb-05	6.8	7.4
10-Mar-05	7.1	7.7
10-Apr-05	6.9	7.5
10-May-05	6.9	7.3
10-Jun-05	6.8	7.3
10-Jul-05	6.7	7.3
10-Aug-05	6.8	7.3
10-Sep-05	6.8	7.2
10-Oct-05	6.8	7.2
10-Nov-05	6.7	7.3
10-Dec-05	6.6	7.2
10-Jan-06	6.3	6.8
10-Feb-06	6.6	6.9
10-Mar-06	6.4	6.9
10-Apr-06	6.4	7.1
10-May-06	6.6	7.3
10-Jun-06	6.9	7.5
10-Jul-06	6.4	7.7
10-Aug-06	6.4	7.7
10-Sep-06	7.2	7.6
10-Oct-06	6.9	7.5
10-Nov-06	7	7.4
10-Dec-06	6.7	7.3
10-Jan-07	6.7	7.3
10-Feb-07	6.9	7.6
10-Mar-07	7	7.6
10-Apr-07	7	7.4
10-May-07	7	7.4
10-Jun-07	7	7.5
10-Jul-07	7.03	7.65
10-Aug-07	6.81	7.53
10-Sep-07	6.81	7.54
10-Oct-07	6.53	7.22
10-Nov-07	6.73	7.21
10-Dec-07	6.39	6.92
10-Jan-08	6.16	7.75
10-Feb-08	6.27	7.04
10-Mar-08	6.59	7.1
10-Apr-08	6.73	7.41
10-May-08	6.61	7.45
10-Jun-08	6.86	7.63
10-Jul-08	6.84	7.83

90th Percentile pH	7.7	S.U.
10th Percentile pH	6.4	S.U.

Pembroke WWTP
VPDES Permit No. VA0088048

Effluent Temperature Data for 90th Percentile Calculation

Days	Jul-07	Aug-07	Sep-07	Oct-07	Nov-07	Dec-07	Jan-08	Feb-08	Mar-08	Apr-08	May-08	Jun-08
1	21.2	22.1	23.3	19.0	14.9	11.8	10.9	8.9	9.2	13.7	14.1	19.5
2	20.1	21.6	23.1	19.4	14.3	12.0	7.4	8.2	8.7	12.6	15.3	19.8
3	20.9	22.3	23.1	20.2	15.4	12.4	6.2	9.7	9.5	12.4	16.1	19.0
4	22.4	23.1	22.0	20.6	15.1	10.2	7.9	9.7	12.2	12.3	16.0	19.5
5	22.1	23.2	20.8	21.1	14.8	10.3	8.1	10.7	10.6	13.1	15.3	20.1
6	22.4	23.2	22.2	21.4	13.7	8.7	9.4	11.7	9.8	12.9	15.2	21.0
7	21.9	23.4	22.4	21.4	13.7	9.4	9.8	10.4	11.1	12.5	15.3	21.7
8	22.2	23.6	22.3	21.2	12.4	11.0	10.9	11.3	11.6	13.1	17.1	23.3
9	22.2	23.8	22.6	21.2	13.7	13.0	11.9	11.0	6.6	12.7	16.4	21.9
10	23.0	23.3	23.0	20.8	14.6	13.5	11.8	9.8	9.4	13.7	17.0	22.7
11	22.9	23.7	22.8	19.0	12.2	14.4	11.9	7.7	9.0	13.6	16.9	22.1
12	22.3	23.7	22.3	18.2	13.9	13.3	10.6	8.8	9.5	16.0	15.4	22.1
13	21.8	22.1	21.3	16.8	15.5	14.2	10.9	9.3	9.8	14.2	14.6	22.1
14	21.0	22.2	22.1	16.5	15.5	12.9	9.7	6.5	9.8	13.4	15.0	22.3
15	21.3	21.9	21.8	17.5	14.9	11.8	9.7	7.3	11.7	12.1	16.7	22.2
16	22.3	22.4	19.2	18.1	12.3	11.4	8.3	9.4	11.1	12.5	17.4	20.9
17	22.3	23.1	19.6	19.0	12.3	9.5	7.2	10.1	11.2	12.1	15.9	21.1
18	22.5	23.0	19.7	20.2	12.0	8.1	8.8	12.5	10.5	12.6	16.6	20.0
19	23.2	22.0	19.9	20.8	13.9	10.3	9.3	10.9	12.7	14.2	16.1	19.4
20	23.0	22.8	20.0	19.5	15.4	9.4	9.2	10.8	11.5	13.0	15.3	19.2
21	21.8	22.6	21.3	18.5	15.2	10.2	6.9	9.2	11.5	13.9	16.5	19.9
22	21.2	23.1	21.3	18.0	15.6	10.5	7.9	9.6	11.6	14.7	16.2	20.8
23	21.1	23.3	20.3	19.5	13.9	11.5	9.2	11.1	11.0	15.0	16.1	20.1
24	21.1	24.0	21.8	20.3	14.1	10.0	8.3	9.6	10.5	15.3	16.9	20.0
25	21.0	23.1	21.0	19.4	14.6	10.1	5.9	9.6	10.2	15.8	16.6	20.0
26	21.3	23.5	22.5	18.4	13.6	10.3	7.9	10.6	10.8	16.0	17.1	20.4
27	20.9	23.5	21.7	18.2	13.6	10.3	8.7	9.1	11.6	16.8	18.4	21.3
28	21.6	23.6	21.8	17.2	12.7	11.2	8.5	8.6	12.4	16.6	19.0	21.0
29	22.0	23.5	21.6	15.9	11.5	11.2	9.4	7.9	12.4	14.0	18.5	21.9
30	22.5	23.8	18.8	14.2	11.4	11.3	8.6		10.9	13.3	18.6	21.5
31	21.4	23.4		14.9		11.2	8.6		11.0		19.5	

Data are given as Celsius.

90th percentile 22.5 °C

90th percentile 16.6 °C (wet season - Jan - May)

OLVER LABORATORIES
Consulting Scientists • Environmental Laboratories
1116 South Main Street Blacksburg, Virginia 24060
Phone (540) 552-6974 Fax (540) 552-1715

BID Rec'd 12/12/15 12/10/02

DEQ - WCRO
OCT 10 2002
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Client Sheet No.:	14806	**Job No.:**	31933
Date:	September 6, 2002	**Date Received:**	8/21/02
Client:	Town of Pembroke VA0068048		
Source:	Pembroke, Virginia		
Shipping Information:	Delivered to Olver Laboratories Incorporated by Town Personnel		

Sample No.:	149871
Date Collected:	8/21/02
Time Collected:	8:00 a.m.
Description:	Effluent Wastewater Composite

Analysis	Result		QL		Date/Time Analyzed	Analysts' Initials
Ammonia as N (SM 4500NH_3,F)	300	µg/L	200	µg/L	8/22/02; 0730	JR
Hardness as $CaCO_3$ (EPA 130.2)	143,000	µg/L	5,000	µg/L	8/26/02; 1345	KAB

QL = Quantitation Limit

All tests according to Standard Methods for the Examination of Water and Wastewater, 18th Edition, Test Methods for Evaluating Solid Waste (Physical/Chemical), 2nd and 3rd Editions, Methods for the Chemical Analysis of Water and Wastes, EPA, and Methods of Soil Analysis, Part 2.

By: Brit Ritchey
Brit Ritchey
Vice President of Laboratory Operations

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REI Consultants, Inc. Analytical Results

Date: *25-Jun-08*

CLIENT: TOWN OF PEMBROKE
Client Sample ID: 001 GRAB
Project: ATTACHEMENT A
Site ID: VA 0088048

WorkOrder: 0704252
Lab ID: 0704252-01A
Collection Date: 4/4/2007 10:00:00 AM
Matrix: WASTE WATER

Analyses	Result	Units	Qual	PQL	MCL	Prep Date	Date Analyzed
DISSOLVED METALS BY ICP-MS			**E200.8**			Analyst: **DBB**	
Antimony	ND	mg/L		0.0010	NA	04/09/07 12:00 AM	04/10/07 11:35 AM
SEMIVOLATILE ORGANIC COMPOUNDS			**E625**			Analyst: **CLS**	
Acenaphthene	ND	mg/L		0.0104	NA	04/11/07 11:02 AM	04/12/07 8:06 PM
Butyl benzyl phthalate	ND	mg/L		0.0104	NA	04/11/07 11:02 AM	04/12/07 8:06 PM
2-Chlorophenol	ND	mg/L		0.0104	NA	04/11/07 11:02 AM	04/12/07 8:06 PM
Di-n-butyl phthalate	ND	mg/L		0.0104	NA	04/11/07 11:02 AM	04/12/07 8:06 PM
2,4-Dichlorophenol	ND	mg/L		0.0104	NA	04/11/07 11:02 AM	04/12/07 8:06 PM
Diethyl phthalate	ND	mg/L		0.0104	NA	04/11/07 11:02 AM	04/12/07 8:06 PM
2,4-Dimethylphenol	ND	mg/L		0.0104	NA	04/11/07 11:02 AM	04/12/07 8:06 PM
Fluorene	ND	mg/L		0.0104	NA	04/11/07 11:02 AM	04/12/07 8:06 PM
Nitrobenzene	ND	mg/L		0.0104	NA	04/11/07 11:02 AM	04/12/07 8:06 PM
1,2,4-Trichlorobenzene	ND	mg/L		0.0104	NA	04/11/07 11:02 AM	04/12/07 8:06 PM
VOLATILE ORGANIC COMPOUNDS			**SW8021B**			Analyst: **M**	
m,p-Xylene	ND	µg/L		2.00	NA		04/09/07 4:55 PM
o-Xylene	ND	µg/L		1.00	NA		04/09/07 4:55 PM
VOLATILE ORGANIC COMPOUNDS			**E624**			Analyst: **AS**	
1,1-Dichloroethene	ND	µg/L		5.0	NA		04/09/07 11:37 AM
HYDROGEN SULFIDE			**E376.1**			Analyst: **LK**	
Hydrogen Sulfide	1.40	mg/L		1.00	NA		04/06/07 3:00 PM

Key: MCL Maximum Contaminant Level; MDL Minimum Detection Limit; NA Not Applicable; ND Not Detected at the PQL or MDL; PQL Practical Quantitation Limit; TIC Tentatively Identified Compound, Estimated Concentration

Qualifiers: B Analyte detected in the associated Method Blank; E Estimated Value above quantitation range; H Holding times for preparation or analysis exceeded; S Spike/Surrogate Recovery outside accepted recovery limits; * Value exceeds Maximum Contaminant Level

REI Consultants, Inc. Analytical Results

Date: *25-Jun-08*

CLIENT:	TOWN OF PEMBROKE	**WorkOrder:**	0704252
Client Sample ID:	001 COMP	**Lab ID:**	0704252-02A
Project:	ATTACHEMENT A	**Collection Date:**	4/4/2007 10:00:00 AM
Site ID:	VA 0088048	**Matrix:**	WASTE WATER

Analyses	Result	Units	Qual	PQL	MCL	Prep Date	Date Analyzed
HARDNESS			**SM2340 B**			Analyst: **JD**	
Hardness, Total (As CaCO3)	53.8	mg/L		1.00	NA	04/09/07 12:00 AM	04/09/07 10:27 PM

Key: MCL Maximum Contaminant Level
MDL Minimum Detection Limit
NA Not Applicable
ND Not Detected at the PQL or MDL
PQL Practical Quantitation Limit
TIC Tentatively Identified Compound, Estimated Concentration

Qualifiers:
B Analyte detected in the associated Method Blank
E Estimated Value above quantitation range
H Holding times for preparation or analysis exceeded
S Spike/Surrogate Recovery outside accepted recovery limits
* Value exceeds Maximum Contaminant Level

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Client Sheet No. 14806
Client Town of Pembroke
Date September 6, 2002

Sample No.: 149872
Date Collected: 8/21/02
Time Collected: 9:30 a.m.
Description: Effluent Wastewater Grab

Analysis	Result		QL		SSTV		Date/Time Analyzed	Analysts' Initials
Total Cyanide (EPA 335.2)	BQL		100	µg/L	N/A		8/22/02; 0800	SBH
Dissolved Hexavalent (SM 3500Cr,D)	BQL		50	µg/L	384	µg/L	8/21/02; 1130	NA
Total Arsenic (EPA 200.9)	BQL		10	µg/L	50	µg/L	8/26/02; 1820	TSS
Total Barium (EPA 200.7)	BQL		20	µg/L	N/A		8/28/02; 1045	SC
Total Cadmium (EPA 200.9)	BQL		1	µg/L	65	µg/L	8/28/02; 0830	TSS
Total Copper (EPA 200.9)	12	µg/L	10	µg/L	312	µg/L	8/28/02; 1720	TSS
Total Lead (EPA 200.9)	BQL		10	µg/L	1,884	µg/L	8/26/02; 1400	TSS
Total Mercury (EPA 245.1)	BQL		0.2	µg/L	16	µg/L	8/26/02; 1200	SAH
Total Nickel (EPA 200.9)	BQL		10	µg/L	3,327	µg/L	8/26/02; 1900	TSS
Total Selenium (EPA 200.9)	BQL		10	µg/L	480	µg/L	8/26/02; 2200	TSS
Total Silver (EPA 200.9)	BQL		2	µg/L	55	µg/L	8/28/02; 1315	TSS
Total Zinc (EPA 200.7)	89	µg/L	50	µg/L	2,130	µg/L	8/28/02; 1045	SC

SSTV = Site-Specific Target Value
BQL = Below Quantitation Limit
N/A = Not Applicable

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Client Sheet No. 14806
Client Town of Pembroke
Date September 6, 2002

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Sample No.: 149873
Date Collected: 8/20/02
Time Collected: 8:00 a.m.
Description: Effluent Wastewater Grab

Analysis	Result	QL		Date/Time Analyzed	Analyst Initials
Pesticides/PCBs (EPA 608):				8/29/02; 0855	DF
Aldrin	BQL	0.05	µg/L		
Chlordane	BQL	0.2	µg/L		
DDT	BQL	0.1	µg/L		
Dieldrin	BQL	0.1	µg/L		
Endosulfan I	BQL	0.1	µg/L		
Endosulfan II	BQL	0.1	µg/L		
Endosulfan Sulfate	BQL	0.1	µg/L		
Endrin	BQL	0.1	µg/L		
Heptachlor	BQL	0.05	µg/L		
Hexachlorocyclohexane	BQL	0.05	µg/L		
Methoxychlor	BQL	10	µg/L		
Mirex	BQL	0.1	µg/L		
Toxaphene	BQL	5.0	µg/L		
PCB-1242	BQL	1.0	µg/L		
PCB-1254	BQL	1.0	µg/L		
PCB-1221	BQL	1.0	µg/L		
PCB-1232	BQL	1.0	µg/L		
PCB-1248	BQL	1.0	µg/L		
PCB-1260	BQL	1.0	µg/L		
PCB-1016	BQL	1.0	µg/L		

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Client Sheet No.	14806
Client	Town of Pembroke
Date	September 6, 2002
Sample No.:	149873
Date Collected:	8/20/02
Time Collected:	8:00 a.m.
Description:	Effluent Wastewater Grab

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Analysis	Result	QL		Date/Time Analyzed	Analyst Initials
Pesticides (EPA 622):				8/29/02; 0855	PMW
Chlorpyrifos (Dursban)	BQL	0.2	µg/L		
Demeton	BQL	0.2	µg/L		
Guthion	BQL	0.2	µg/L		
Malathion	BQL	0.2	µg/L		
Parathion	BQL	0.2	µg/L		
Herbicides (SW-846 8151A):				8/30/02; 1526	DF
2,4,5-Trichlorophenoxypropionic acid (Silvex)	BQL	0.2	µg/L		
2,4-Dichlorophenoxy (2,4-D)	BQL	0.2	µg/L		
Base/Neutral Extractable Organic Compounds (EPA 625):				8/20/02; 2149	PMW
Anthracene	BQL	10	µg/L		
Benzo(a)anthracene	BQL	10	µg/L		
Benzo(b)fluoranthene	BQL	10	µg/L		
Benzo(k)fluoranthene	BQL	10	µg/L		
Benzo(a)pyrene	BQL	10	µg/L		
Chrysene	BQL	10	µg/L		
Dibenz(a,h)anthracene	BQL	20	µg/L		
1,2-Dichlorobenzene	BQL	10	µg/L		
1,3-Dichlorobenzene	BQL	10	µg/L		
1,4-Dichlorobenzene	BQL	10	µg/L		
2,4-Dinitrotoluene	BQL	10	µg/L		
Di-2-ethylhexylphthalate	BQL	10	µg/L		
Fluoranthene	BQL	10	µg/L		
Indeno (1,2,3-cd) Pyrene	BQL	20	µg/L		
Isophorone	BQL	10	µg/L		
Naphthalene	BQL	10	µg/L		
Pyrene	BQL	10	µg/L		

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Client Sheet No.	14806
Client	Town of Pembroke
Date	September 6, 2002
Sample No.:	149873
Date Collected:	8/20/02
Time Collected:	8:00 a.m.
Description:	Effluent Wastewater Grab

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Analysis	Result		QL	Date/Time Analyzed	Analyst Initials
Acid Extractables Organic Compounds (EPA 625):				8/28/02; 2149	PMW
Pentachlorophenol	BQL	50	µg/L		
Phenol	BQL	10	µg/L		
2,4,6-Trichlorophenol	BQL	10	µg/L		
Volatile Organic Compounds (EPA 624):				8/23/02; 0615	BP
Benzene	BQL	10	µg/L		
Bromoform	BQL	10	µg/L		
Carbon Tetrachloride	BQL	10	µg/L		
Chlorodibromomethane	BQL	10	µg/L		
Chloroform	BQL	10	µg/L		
Chloromethane	BQL	20	µg/L		
Dichloromethane	BQL	10	µg/L		
Dichlorobromomethane	BQL	20	µg/L		
1,2-Dichloroethane	BQL	10	µg/L		
Ethylbenzene	BQL	10	µg/L		
Monochlorobenzene	BQL	50	µg/L		
Tetrachloroethylene	BQL	10	µg/L		
Toluene	BQL	10	µg/L		
Trichloroethylene	BQL	10	µg/L		
Vinyl chloride	BQL	10	µg/L		

EVOLVER
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Client Sheet No. 14806
Client Town of Pembroke
Date September 6, 2002

Sample No.: 149874
Date Collected: 8/20/02
Time Collected: 4:00 p.m.
Description: Effluent Wastewater Grab

Analysis	Result	QL		Date/Time Analyzed	Analyst Initials
Pesticides/PCBs (EPA 608):				8/29/02; 1029	PMW
Aldrin	BQL	0.05	µg/L		
Chlordane	BQL	0.2	µg/L		
DDT	BQL	0.1	µg/L		
Dieldrin	BQL	0.1	µg/L		
Endosulfan I	BQL	0.1	µg/L		
Endosulfan II	BQL	0.1	µg/L		
Endosulfan Sulfate	BQL	0.1	µg/L		
Endrin	BQL	0.1	µg/L		
Heptachlor	BQL	0.05	µg/L		
Hexachlorocyclohexane	BQL	0.05	µg/L		
Methoxychlor	BQL	10	µg/L		
Mirex	BQL	0.1	µg/L		
Toxaphene	BQL	5.0	µg/L		
PCB-1242	BQL	1.0	µg/L		
PCB-1254	BQL	1.0	µg/L		
PCB-1221	BQL	1.0	µg/L		
PCB-1232	BQL	1.0	µg/L		
PCB-1248	BQL	1.0	µg/L		
PCB-1260	BQL	1.0	µg/L		
PCB-1016	BQL	1.0	µg/L		

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LABORATORIES

Client Sheet No. 14806
Client Town of Pembroke
Date September 6, 2002

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Sample No.: 149874
Date Collected: 8/20/02
Time Collected: 4:00 p.m.
Description: Effluent Wastewater Grab

Analysis	Result	QL		Date/Time Analyzed	Analyst Initials
Pesticides (EPA 622):				8/29/02; 0926	DF
Chlorpyrifos (Dursban)	BQL	0.2	µg/L		
Demeton	BQL	0.2	µg/L		
Guthion	BQL	0.2	µg/L		
Malathion	BQL	0.2	µg/L		
Parathion	BQL	0.2	µg/L		
Herbicides (SW-846 8151A):				8/30/02; 1542	DF
2,4,5-Trichlorophenoxypropionic acid (Silvex)	BQL	0.2	µg/L		
2,4-Dichlorophenoxy (2,4-D)	BQL	0.2	µg/L		
Base/Neutral Extractable Organic Compounds (EPA 625):				8/28/02; 1029	PMW
Anthracene	BQL	10	µg/L		
Benzo(a)anthracene	BQL	10	µg/L		
Benzo(b)fluoranthene	BQL	10	µg/L		
Benzo(k)fluoranthene	BQL	10	µg/L		
Benzo(a)pyrene	BQL	10	µg/L		
Chrysene	BQL	10	µg/L		
Dibenz(a,h)anthracene	BQL	20	µg/L		
1,2-Dichlorobenzene	BQL	10	µg/L		
1,3-Dichlorobenzene	BQL	10	µg/L		
1,4-Dichlorobenzene	BQL	10	µg/L		
2,4-Dinitrotoluene	BQL	10	µg/L		
Di-2-ethylhexylphthalate	BQL	10	µg/L		
Fluoranthene	BQL	10	µg/L		
Indeno (1,2,3-cd) Pyrene	BQL	20	µg/L		
Isophorone	BQL	10	µg/L		
Naphthalene	BQL	10	µg/L		
Pyrene	BQL	10	µg/L		

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Client Sheet No.	14806
Client	Town of Pembroke
Date	September 6, 2002
Sample No.:	149874
Date Collected:	8/20/02
Time Collected:	4:00 p.m.
Description:	Effluent Wastewater Grab

Analysis	Result	QL		Date/Time Analyzed	Analyst Initials
Acid Extractables Organic Compounds (EPA 625):				8/28/02; 1029	PMW
Pentachlorophenol	BQL	50	µg/L		
Phenol	BQL	10	µg/L		
2,4,6-Trichlorophenol	BQL	10	µg/L		
Volatile Organic Compounds (EPA 624):				8/23/02; 0644	BP
Benzene	BQL	10	µg/L		
Bromoform	BQL	10	µg/L		
Carbon Tetrachloride	BQL	10	µg/L		
Chlorodibromomethane	BQL	10	µg/L		
Chloroform	BQL	10	µg/L		
Chloromethane	BQL	20	µg/L		
Dichloromethane	BQL	10	µg/L		
Dichlorobromomethane	BQL	20	µg/L		
1,2-Dichloroethane	BQL	10	µg/L		
Ethylbenzene	BQL	10	µg/L		
Monochlorobenzene	BQL	50	µg/L		
Tetrachloroethylene	BQL	10	µg/L		
Toluene	BQL	10	µg/L		
Trichloroethylene	BQL	10	µg/L		
Vinyl chloride	BQL	10	µg/L		

OLVER
LABORATORIES

Client Sheet No. 14806
Client Town of Pembroke
Date September 6, 2002

DEP - WCPD
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Sample No.: 149875
Date Collected: 8/21/02
Time Collected: 12:00 a.m.
Description: Effluent Wastewater Grab

Analysis	Result	QL		Date/Time Analyzed	Analyst Initials
Pesticides/PCBs (EPA 608):				8/29/02; 0956	DF
Aldrin	BQL	0.05	µg/L		
Chlordane	BQL	0.2	µg/L		
DDT	BQL	0.1	µg/L		
Dieldrin	BQL	0.1	µg/L		
Endosulfan I	BQL	0.1	µg/L		
Endosulfan II	BQL	0.1	µg/L		
Endosulfan Sulfate	BQL	0.1	µg/L		
Endrin	BQL	0.1	µg/L		
Heptachlor	BQL	0.05	µg/L		
Hexachlorocyclohexane	BQL	0.05	µg/L		
Methoxychlor	BQL	10	µg/L		
Mirex	BQL	0.1	µg/L		
Toxaphene	BQL	5.0	µg/L		
PCB-1242	BQL	1.0	µg/L		
PCB-1254	BQL	1.0	µg/L		
PCB-1221	BQL	1.0	µg/L		
PCB-1232	BQL	1.0	µg/L		
PCB-1248	BQL	1.0	µg/L		
PCB-1260	BQL	1.0	µg/L		
PCB-1016	BQL	1.0	µg/L		

OLVER
LABORATORIES

Client Sheet No. 14806
Client Town of Pembroke
Date September 6, 2002

Sample No.: 149875
Date Collected: 8/21/02
Time Collected: 12:00 a.m.
Description: Effluent Wastewater Grab

Analysis	Result	QL		Date/Time Analyzed	Analyst Initials
Pesticides (EPA 622):				8/29/02; 0956	PMW
Chlorpyrifos (Dursban)	BQL	0.2	µg/L		
Demeton	BQL	0.2	µg/L		
Guthion	BQL	0.2	µg/L		
Malathion	BQL	0.2	µg/L		
Parathion	BQL	0.2	µg/L		
Herbicides (SW-846 8151A):				8/30/02; 1557	DF
2,4,5-Trichlorophenoxypropionic acid (Silvex)	BQL	0.2	µg/L		
2,4-Dichlorophenoxy (2,4-D)	BQL	0.2	µg/L		
Base/Neutral Extractable Organic Compounds (EPA 625):				8/29/02; 0112	PMW
Anthracene	BQL	10	µg/L		
Benzo(a)anthracene	BQL	10	µg/L		
Benzo(b)fluoranthene	BQL	10	µg/L		
Benzo(k)fluoranthene	BQL	10	µg/L		
Benzo(a)pyrene	BQL	10	µg/L		
Chrysene	BQL	10	µg/L		
Dibenz(a,h)anthracene	BQL	20	µg/L		
1,2-Dichlorobenzene	BQL	10	µg/L		
1,3-Dichlorobenzene	BQL	10	µg/L		
1,4-Dichlorobenzene	BQL	10	µg/L		
2,4-Dinitrotoluene	BQL	10	µg/L		
Di-2-ethylhexylphthalate	BQL	10	µg/L		
Fluoranthene	BQL	10	µg/L		
Indeno (1,2,3-cd) Pyrene	BQL	20	µg/L		
Isophorone	BQL	10	µg/L		
Naphthalene	BQL	10	µg/L		
Pyrene	BQL	10	µg/L		

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LABORATORIES

Client Sheet No.	14806
Client	Town of Pembroke
Date	September 6, 2002
Sample No.:	149875
Date Collected:	8/21/02
Time Collected:	12:00 a.m.
Description:	Effluent Wastewater Grab

Analysis	Result	QL		Date/Time Analyzed	Analyst Initials
Acid Extractables Organic Compounds (EPA 625):				8/29/02; 0112	PMW
Pentachlorophenol	BQL	50	µg/L		
Phenol	BQL	10	µg/L		
2,4,6-Trichlorophenol	BQL	10	µg/L		
Volatile Organic Compounds (EPA 624):				8/23/02; 0713	BP
Benzene	BQL	10	µg/L		
Bromoform	BQL	10	µg/L		
Carbon Tetrachloride	BQL	10	µg/L		
Chlorodibromomethane	BQL	10	µg/L		
Chloroform	BQL	10	µg/L		
Chloromethane	BQL	20	µg/L		
Dichloromethane	BQL	10	µg/L		
Dichlorobromomethane	BQL	20	µg/L		
1,2-Dichloroethane	BQL	10	µg/L		
Ethylbenzene	BQL	10	µg/L		
Monochlorobenzene	BQL	50	µg/L		
Tetrachloroethylene	BQL	10	µg/L		
Toluene	BQL	10	µg/L		
Trichloroethylene	BQL	10	µg/L		
Vinyl chloride	BQL	10	µg/L		

Attachment G

Wasteload and Limit Calculations

- Mixing Zone Calculations (MIXER)
- Wasteload Allocation Spreadsheet
- STATS Program Results

Mixing Zone Predictions for Pembroke WWTP

Effluent Flow = 0.2 MGD
Stream 7Q10 = 514 MGD
Stream 30Q10 = 640 MGD
Stream 1Q10 = 409 MGD
Stream slope = 0.0013 ft/ft
Stream width = 750 ft
Bottom scale = 4
Channel scale = 1

Mixing Zone Predictions @ 7Q10

Depth = 1.8435 ft
Length = 252766.19 ft
Velocity = .5753 ft/sec
Residence Time = 5.0852 days

Recommendation:

A complete mix assumption is appropriate for this situation providing no more than 39.33% of the 7Q10 is used.

Mixing Zone Predictions @ 30Q10

Depth = 2.1046 ft
Length = 226144.69 ft
Velocity = .6278 ft/sec
Residence Time = 4.1689 days

Recommendation:

A complete mix assumption is appropriate for this situation providing no more than 47.97% of the 30Q10 is used.

Mixing Zone Predictions @ 1Q10

Depth = 1.6081 ft
Length = 283236.12 ft
Velocity = .5252 ft/sec
Residence Time = 149.8011 hours

Recommendation:

A complete mix assumption is appropriate for this situation providing no more than .67% of the 1Q10 is used.

FRESHWATER
WATER QUALITY CRITERIA / WASTELOAD ALLOCATION ANALYSIS

Facility Name: Pembroke WWTP Permit No.: VA0088048

Receiving Stream: New River Version: OWP Guidance Memo 00-2011 (8/24/00)

Stream Information		Stream Flows		Mixing Information		Effluent Information	
Mean Hardness (as CaCO3) =	67.8 mg/L	1Q10 (Annual) =	409 MGD	Annual - 1Q10 Mix =	0.67 %	Mean Hardness (as CaCO3) =	53.8 mg/L
90% Temperature (Annual) =	24.7 deg C	7Q10 (Annual) =	514 MGD	- 7Q10 Mix =	39.33 %	90% Temp (Annual) =	22.5 deg C
90% Temperature (Wet season) =	17.3 deg C	30Q10 (Annual) =	640 MGD	- 30Q10 Mix =	47.97 %	90% Temp (Wet season) =	16.6 deg C
90% Maximum pH =	8.6 SU	1Q10 (Wet season) =	604 MGD	Wet Season - 1Q10 Mix =	100 %	90% Maximum pH =	7.7 SU
10% Maximum pH =	7.4 SU	30Q10 (Wet season)	~~640 MGD~~	- 30Q10 Mix =	100 %	10% Maximum pH =	6.4 SU
Tier Designation (1 or 2) =	2	30Q5 =	732 MGD			Discharge Flow =	0.2 MGD
Public Water Supply (PWS) Y/N? =	n	Harmonic Mean =	1616 MGD				
Trout Present Y/N? =	n	Annual Average =	MGD				
Early Life Stages Present Y/N? =	y						

Parameter	Background	Water Quality Criteria				Wasteload Allocations				Antidegradation Baseline				Antidegradation Allocations				**Most Limiting Allocations**			
(ug/l unless noted)	Conc.	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	**Acute**	**Chronic**	**HH (PWS)**	**HH**
Acenapthene	0	--	--	na	2.7E+03	--	--	na	9.9E+06	--	--	na	2.7E+02	--	--	na	9.9E+05	--	--	**na**	**9.9E+05**
Acrolein	0	--	--	na	7.8E+02	--	--	na	2.9E+06	--	--	na	7.8E+01	--	--	na	2.9E+05	--	--	**na**	**2.9E+05**
Acrylonitrile[C]	0	--	--	na	6.6E+00	--	--	na	5.3E+04	--	--	na	6.6E-01	--	--	na	5.3E+03	--	--	**na**	**5.3E+03**
Aldrin [C]	0	3.0E+00	--	na	1.4E-03	4.4E+01	--	na	1.1E+01	7.5E-01	--	na	1.4E-04	1.5E+03	--	na	1.1E+00	**4.4E+01**	--	**na**	**1.1E+00**
Ammonia-N (mg/l) (Yearly)	0	3.65E+00	4.79E-01	na	--	5.4E+01	7.4E+02	na	--	6.65E-01	1.19E-01	na	--	1.4E+03	3.8E+02	na	--	**5.4E+01**	**3.8E+02**	**na**	--
Ammonia-N (mg/l) (High Flow)	0	2.66E+00	7.70E-01	na	--	8.0E+03	2.5E+03	na	--	6.64E-01	1.93E-01	na	--	2.0E+03	6.2E+02	na	--	**2.0E+03**	**6.2E+02**	**na**	--
Anthracene	0	--	--	na	1.1E+05	--	--	na	4.0E+08	--	--	na	1.1E+04	--	--	na	4.0E+07	--	--	**na**	**4.0E+07**
Antimony	0	--	--	na	4.3E+03	--	--	na	1.6E+07	--	--	na	4.3E+02	--	--	na	1.6E+06	--	--	**na**	**1.6E+06**
Arsenic	o	3.4E+02	1.5E+02	na	--	5.0E+03	1.5E+05	na	--	8.5E+01	3.8E+01	na	--	1.7E+05	9.6E+04	na	--	**5.0E+03**	**9.6E+04**	**na**	--
Barium	0	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--	--	--	**na**	--
Benzene [C]	0	--	--	na	7.1E+02	--	--	na	5.7E+06	--	--	na	7.1E+01	--	--	na	5.7E+05	--	--	**na**	**5.7E+05**
Benzidine[C]	0	--	--	na	5.4E-03	--	--	na	4.4E+01	--	--	na	5.4E-04	--	--	na	4.4E+00	--	--	**na**	**4.4E+00**
Benzo (a) anthracene [C]	0	--	--	na	4.9E-01	--	--	na	4.0E+03	--	--	na	4.9E-02	--	--	na	4.0E+02	--	--	**na**	**4.0E+02**
Benzo (b) fluoranthene [C]	0	--	--	na	4.9E-01	--	--	na	4.0E+03	--	--	na	4.9E-02	--	--	na	4.0E+02	--	--	**na**	**4.0E+02**
Benzo (k) fluoranthene [C]	0	--	--	na	4.9E-01	--	--	na	4.0E+03	--	--	na	4.9E-02	--	--	na	4.0E+02	--	--	**na**	**4.0E+02**
Benzo (a) pyrene [C]	0	--	--	na	4.9E-01	--	--	na	4.0E+03	--	--	na	4.9E-02	--	--	na	4.0E+02	--	--	**na**	**4.0E+02**
Bis2-Chloroethyl Ether	0	--	--	na	1.4E+01	--	--	na	5.1E+04	--	--	na	1.4E+00	--	--	na	5.1E+03	--	--	**na**	**5.1E+03**
Bis2-Chloroisopropyl Ether	0	--	--	na	1.7E+05	--	--	na	6.2E+08	--	--	na	1.7E+04	--	--	na	6.2E+07	--	--	**na**	**6.2E+07**
Bromoform [C]	0	--	--	na	3.6E+03	--	--	na	2.9E+07	--	--	na	3.6E+02	--	--	na	2.9E+06	--	--	**na**	**2.9E+06**
Butylbenzylphthalate	0	--	--	na	5.2E+03	--	--	na	1.9E+07	--	--	na	5.2E+02	--	--	na	1.9E+06	--	--	**na**	**1.9E+06**
Cadmium	0	2.5E+00	8.4E-01	na	--	3.7E+01	8.5E+02	na	--	6.3E-01	2.1E-01	na	--	1.3E+03	5.4E+02	na	--	**3.7E+01**	**5.4E+02**	**na**	--
Carbon Tetrachloride [C]	0	--	--	na	4.4E+01	--	--	na	3.6E+05	--	--	na	4.4E+00	--	--	na	3.6E+04	--	--	**na**	**3.6E+04**
Chlordane [C]	0	2.4E+00	4.3E-03	na	2.2E-02	3.5E+01	4.4E+00	na	1.8E+02	6.0E-01	1.1E-03	na	2.2E-03	1.2E+03	2.8E+00	na	1.8E+01	**3.5E+01**	**2.8E+00**	**na**	**1.8E+01**
Chloride	0	8.6E+05	2.3E+05	na	--	1.3E+07	2.3E+08	na	--	2.2E+05	5.8E+04	na	--	4.4E+08	1.5E+08	na	--	**1.3E+07**	**1.5E+08**	**na**	--
TRC	0	1.9E+01	1.1E+01	na	--	2.8E+02	1.1E+04	na	--	4.8E+00	2.8E+00	na	--	9.7E+03	7.1E+03	na	--	**2.8E+02**	**7.1E+03**	**na**	--
Chlorobenzene	0	--	--	na	2.1E+04	--	--	na	7.7E+07	--	--	na	2.1E+03	--	--	na	7.7E+06	--	--	**na**	**7.7E+06**

Parameter	Background	Water Quality Criteria				Wasteload Allocations				Antidegradation Baseline				Antidegradation Allocations				Most Limiting Allocations			
(ug/l unless noted)	Conc.	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH
Chlorodibromomethane[C]	0	--	--	na	3.4E+02	--	--	na	2.7E+06	--	--	na	3.4E+01	--	--	na	2.7E+05	--	--	na	**2.7E+05**
Chloroform [C]	0	--	--	na	2.9E+04	--	--	na	2.3E+08	--	--	na	2.9E+03	--	--	na	2.3E+07	--	--	na	**2.3E+07**
2-Chloronaphthalene	0	--	--	na	4.3E+03	--	--	na	1.6E+07	--	--	na	4.3E+02	--	--	na	1.6E+06	--	--	na	**1.6E+06**
2-Chlorophenol	0	--	--	na	4.0E+02	--	--	na	1.5E+06	--	--	na	4.0E+01	--	--	na	1.5E+05	--	--	na	**1.5E+05**
Chlorpyrifos	0	8.3E-02	4.1E-02	na	--	1.2E+00	4.1E+01	na	--	2.1E-02	1.0E-02	na	--	4.2E+01	2.6E+01	na	--	**1.2E+00**	**2.6E+01**	na	--
Chromium III	0	4.1E+02	5.4E+01	na	--	6.0E+03	5.5E+04	na	--	1.0E+02	1.3E+01	na	--	2.1E+05	3.5E+04	na	--	**6.0E+03**	**3.5E+04**	na	--
Chromium VI	0	1.6E+01	1.1E+01	na	--	2.4E+02	1.1E+04	na	--	4.0E+00	2.8E+00	na	--	8.2E+03	7.1E+03	na	--	**2.4E+02**	**7.1E+03**	na	--
Chromium, Total	0	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--
Chrysene [C]	0	--	--	na	4.9E-01	--	--	na	4.0E+03	--	--	na	4.9E-02	--	--	na	4.0E+02	--	--	na	**4.0E+02**
Copper	0	9.2E+00	6.4E+00	na	--	1.4E+02	6.5E+03	na	--	2.3E+00	1.6E+00	na	--	4.8E+03	4.1E+03	na	--	**1.4E+02**	**4.1E+03**	na	--
Cyanide	0	2.2E+01	5.2E+00	na	2.2E+05	3.2E+02	5.3E+03	na	7.9E+08	5.5E+00	1.3E+00	na	2.2E+04	1.1E+04	3.3E+03	na	7.9E+07	**3.2E+02**	**3.3E+03**	na	**7.9E+07**
DDD [C]	0	--	--	na	8.4E-03	--	--	na	6.8E+01	--	--	na	8.4E-04	--	--	na	6.8E+00	--	--	na	**6.8E+00**
DDE [C]	0	--	--	na	5.9E-03	--	--	na	4.8E+01	--	--	na	5.9E-04	--	--	na	4.8E+00	--	--	na	**4.8E+00**
DDT [C]	0	1.1E+00	1.0E-03	na	5.9E-03	1.6E+01	1.0E+00	na	4.8E+01	2.8E-01	2.5E-04	na	5.9E-04	5.6E+02	6.4E-01	na	4.8E+00	**1.6E+01**	**6.4E-01**	na	**4.8E+00**
Demeton	0	--	1.0E-01	na	--	--	1.0E+02	na	--	--	2.5E-02	na	--	--	6.4E+01	na	--	--	**6.4E+01**	na	--
Dibenz(a,h)anthracene [C]	0	--	--	na	4.9E-01	--	--	na	4.0E+03	--	--	na	4.9E-02	--	--	na	4.0E+02	--	--	na	**4.0E+02**
Dibutyl phthalate	0	--	--	na	1.2E+04	--	--	na	4.4E+07	--	--	na	1.2E+03	--	--	na	4.4E+06	--	--	na	**4.4E+06**
Dichloromethane (Methylene Chloride) [C]	0	--	--	na	1.6E+04	--	--	na	1.3E+08	--	--	na	1.6E+03	--	--	na	1.3E+07	--	--	na	**1.3E+07**
1,2-Dichlorobenzene	0	--	--	na	1.7E+04	--	--	na	6.2E+07	--	--	na	1.7E+03	--	--	na	6.2E+06	--	--	na	**6.2E+06**
1,3-Dichlorobenzene	0	--	--	na	2.6E+03	--	--	na	9.5E+06	--	--	na	2.6E+02	--	--	na	9.5E+05	--	--	na	**9.5E+05**
1,4-Dichlorobenzene	0	--	--	na	2.6E+03	--	--	na	9.5E+06	--	--	na	2.6E+02	--	--	na	9.5E+05	--	--	na	**9.5E+05**
3,3-Dichlorobenzidine[C]	0	--	--	na	7.7E-01	--	--	na	6.2E+03	--	--	na	7.7E-02	--	--	na	6.2E+02	--	--	na	**6.2E+02**
Dichlorobromomethane [C]	0	--	--	na	4.6E+02	--	--	na	3.7E+06	--	--	na	4.6E+01	--	--	na	3.7E+05	--	--	na	**3.7E+05**
1,2-Dichloroethane [C]	0	--	--	na	9.9E+02	--	--	na	8.0E+06	--	--	na	9.9E+01	--	--	na	8.0E+05	--	--	na	**8.0E+05**
1,1-Dichloroethylene	0	--	--	na	1.7E+04	--	--	na	6.2E+07	--	--	na	1.7E+03	--	--	na	6.2E+06	--	--	na	**6.2E+06**
1,2-trans-dichloroethylene	0	--	--	na	1.4E+05	--	--	na	5.1E+08	--	--	na	1.4E+04	--	--	na	5.1E+07	--	--	na	**5.1E+07**
2,4-Dichlorophenol	0	--	--	na	7.9E+02	--	--	na	2.9E+06	--	--	na	7.9E+01	--	--	na	2.9E+05	--	--	na	**2.9E+05**
2,4-Dichlorophenoxy acetic acid (2,4-D)	0	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--
1,2-Dichloropropane[C]	0	--	--	na	3.9E+02	--	--	na	3.2E+06	--	--	na	3.9E+01	--	--	na	3.2E+05	--	--	na	**3.2E+05**
1,3-Dichloropropene	0	--	--	na	1.7E+03	--	--	na	6.2E+06	--	--	na	1.7E+02	--	--	na	6.2E+05	--	--	na	**6.2E+05**
Dieldrin [C]	0	2.4E-01	5.6E-02	na	1.4E-03	3.5E+00	5.7E+01	na	1.1E+01	6.0E-02	1.4E-02	na	1.4E-04	1.2E+02	3.6E+01	na	1.1E+00	**3.5E+00**	**3.6E+01**	na	**1.1E+00**
Diethyl Phthalate	0	--	--	na	1.2E+05	--	--	na	4.4E+08	--	--	na	1.2E+04	--	--	na	4.4E+07	--	--	na	**4.4E+07**
Di-2-Ethylhexyl Phthalate [C]	0	--	--	na	5.9E+01	--	--	na	4.8E+05	--	--	na	5.9E+00	--	--	na	4.8E+04	--	--	na	**4.8E+04**
2,4-Dimethylphenol	0	--	--	na	2.3E+03	--	--	na	8.4E+06	--	--	na	2.3E+02	--	--	na	8.4E+05	--	--	na	**8.4E+05**
Dimethyl Phthalate	0	--	--	na	2.9E+06	--	--	na	1.1E+10	--	--	na	2.9E+05	--	--	na	1.1E+09	--	--	na	**1.1E+09**
Di-n-Butyl Phthalate	0	--	--	na	1.2E+04	--	--	na	4.4E+07	--	--	na	1.2E+03	--	--	na	4.4E+06	--	--	na	**4.4E+06**
2,4 Dinitrophenol	0	--	--	na	1.4E+04	--	--	na	5.1E+07	--	--	na	1.4E+03	--	--	na	5.1E+06	--	--	na	**5.1E+06**
2-Methyl-4,6-Dinitrophenol	0	--	--	na	7.65E+02	--	--	na	2.8E+06	--	--	na	7.7E+01	--	--	na	2.8E+05	--	--	na	**2.8E+05**
2,4-Dinitrotoluene [C]	0	--	--	na	9.1E+01	--	--	na	7.4E+05	--	--	na	9.1E+00	--	--	na	7.4E+04	--	--	na	**7.4E+04**
Dioxin (2,3,7,8-tetrachlorodibenzo-p-dioxin) (ppq)	0	--	--	na	1.2E-06	--	--	na	na	--	--	na	1.2E-07	--	--	na	1.2E-07	--	--	na	na
1,2-Diphenylhydrazine[C]	0	--	--	na	5.4E+00	--	--	na	4.4E+04	--	--	na	5.4E-01	--	--	na	4.4E+03	--	--	na	**4.4E+03**
Alpha-Endosulfan	0	2.2E-01	5.6E-02	na	2.4E+02	3.2E+00	5.7E+01	na	8.8E+05	5.5E-02	1.4E-02	na	2.4E+01	1.1E+02	3.6E+01	na	8.8E+04	**3.2E+00**	**3.6E+01**	na	**8.8E+04**
Beta-Endosulfan	0	2.2E-01	5.6E-02	na	2.4E+02	3.2E+00	5.7E+01	na	8.8E+05	5.5E-02	1.4E-02	na	2.4E+01	1.1E+02	3.6E+01	na	8.8E+04	**3.2E+00**	**3.6E+01**	na	**8.8E+04**
Endosulfan Sulfate	0	--	--	na	2.4E+02	--	--	na	8.8E+05	--	--	na	2.4E+01	--	--	na	8.8E+04	--	--	na	**8.8E+04**
Endrin	0	8.6E-02	3.6E-02	na	8.1E-01	1.3E+00	3.6E+01	na	3.0E+03	2.2E-02	9.0E-03	na	8.1E-02	4.4E+01	2.3E+01	na	3.0E+02	**1.3E+00**	**2.3E+01**	na	**3.0E+02**
Endrin Aldehyde	0	--	--	na	8.1E-01	--	--	na	3.0E+03	--	--	na	8.1E-02	--	--	na	3.0E+02	--	--	na	**3.0E+02**

Parameter	Background	Water Quality Criteria				Wasteload Allocations				Antidegradation Baseline				Antidegradation Allocations				Most Limiting Allocations			
(ug/l unless noted)	Conc.	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH
Ethylbenzene	0	--	--	na	2.9E+04	--	--	na	1.1E+08	--	--	na	2.9E+03	--	--	na	1.1E+07	--	--	na	**1.1E+07**
Fluoranthene	0	--	--	na	3.7E+02	--	--	na	1.4E+06	--	--	na	3.7E+01	--	--	na	1.4E+05	--	--	na	**1.4E+05**
Fluorene	0	--	--	na	1.4E+04	--	--	na	5.1E+07	--	--	na	1.4E+03	--	--	na	5.1E+06	--	--	na	**5.1E+06**
Foaming Agents	0	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--
Guthion	0	--	1.0E-02	na	--	--	1.0E+01	na	--	--	2.5E-03	na	--	--	6.4E+00	na	--	--	**6.4E+00**	na	--
Heptachlor [C]	0	5.2E-01	3.8E-03	na	2.1E-03	7.6E+00	3.8E+00	na	1.7E+01	1.3E-01	9.5E-04	na	2.1E-04	2.7E+02	2.4E+00	na	1.7E+00	**7.6E+00**	**2.4E+00**	na	**1.7E+00**
Heptachlor Epoxide[C]	0	5.2E-01	3.8E-03	na	1.1E-03	7.6E+00	3.8E+00	na	8.9E+00	1.3E-01	9.5E-04	na	1.1E-04	2.7E+02	2.4E+00	na	8.9E-01	**7.6E+00**	**2.4E+00**	na	**8.9E-01**
Hexachlorobenzene[C]	0	--	--	na	7.7E-03	--	--	na	6.2E+01	--	--	na	7.7E-04	--	--	na	6.2E+00	--	--	na	**6.2E+00**
Hexachlorobutadiene[C]	0	--	--	na	5.0E+02	--	--	na	4.0E+06	--	--	na	5.0E+01	--	--	na	4.0E+05	--	--	na	**4.0E+05**
Hexachlorocyclohexane Alpha-BHC[C]	0	--	--	na	1.3E-01	--	--	na	1.1E+03	--	--	na	1.3E-02	--	--	na	1.1E+02	--	--	na	**1.1E+02**
Hexachlorocyclohexane Beta-BHC[C]	0	--	--	na	4.6E-01	--	--	na	3.7E+03	--	--	na	4.6E-02	--	--	na	3.7E+02	--	--	na	**3.7E+02**
Hexachlorocyclohexane Gamma-BHC[C] (Lindane)	0	9.5E-01	na	na	6.3E-01	1.4E+01	--	na	5.1E+03	2.4E-01	--	na	6.3E-02	4.9E+02	--	na	5.1E+02	**1.4E+01**	--	na	**5.1E+02**
Hexachlorocyclopentadiene	0	--	--	na	1.7E+04	--	--	na	6.2E+07	--	--	na	1.7E+03	--	--	na	6.2E+06	--	--	na	**6.2E+06**
Hexachloroethane[C]	0	--	--	na	8.9E+01	--	--	na	7.2E+05	--	--	na	8.9E+00	--	--	na	7.2E+04	--	--	na	**7.2E+04**
Hydrogen Sulfide	0	--	2.0E+00	na	--	--	2.0E+03	na	--	--	5.0E-01	na	--	--	1.3E+03	na	--	--	**1.3E+03**	na	--
Indeno (1,2,3-cd) pyrene [C]	0	--	--	na	4.9E-01	--	--	na	4.0E+03	--	--	na	4.9E-02	--	--	na	4.0E+02	--	--	na	**4.0E+02**
Iron	0	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--
Isophorone[C]	0	--	--	na	2.6E+04	--	--	na	2.1E+08	--	--	na	2.6E+03	--	--	na	2.1E+07	--	--	na	**2.1E+07**
Kepone	0	--	0.0E+00	na	--	--	0.0E+00	na	--	--	0.0E+00	na	--	--	0.0E+00	na	--	--	**0.0E+00**	na	--
Lead	0	7.1E+01	8.2E+00	na	--	1.0E+03	8.3E+03	na	--	1.8E+01	2.1E+00	na	--	3.7E+04	5.3E+03	na	--	**1.0E+03**	**5.3E+03**	na	--
Malathion	0	--	1.0E-01	na	--	--	1.0E+02	na	--	--	2.5E-02	na	--	--	6.4E+01	na	--	--	**6.4E+01**	na	--
Manganese	0	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--
Mercury	0	1.4E+00	7.7E-01	na	5.1E-02	2.1E+01	7.8E+02	na	1.9E+02	3.5E-01	1.9E-01	na	5.1E-03	7.2E+02	4.9E+02	na	1.9E+01	**2.1E+01**	**4.9E+02**	na	**1.9E+01**
Methyl Bromide	0	--	--	na	4.0E+03	--	--	na	1.5E+07	--	--	na	4.0E+02	--	--	na	1.5E+06	--	--	na	**1.5E+06**
Methoxychlor	0	--	3.0E-02	na	--	--	3.0E+01	na	--	--	7.5E-03	na	--	--	1.9E+01	na	--	--	**1.9E+01**	na	--
Mirex	0	--	0.0E+00	na	--	--	0.0E+00	na	--	--	0.0E+00	na	--	--	0.0E+00	na	--	--	**0.0E+00**	na	--
Monochlorobenzene	0	--	--	na	2.1E+04	--	--	na	7.7E+07	--	--	na	2.1E+03	--	--	na	7.7E+06	--	--	na	**7.7E+06**
Nickel	0	1.3E+02	1.5E+01	na	4.6E+03	1.9E+03	1.5E+04	na	1.7E+07	3.3E+01	3.6E+00	na	4.6E+02	6.7E+04	9.4E+03	na	1.7E+06	**1.9E+03**	**9.4E+03**	na	**1.7E+06**
Nitrate (as N)	0	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--
Nitrobenzene	0	--	--	na	1.9E+03	--	--	na	7.0E+06	--	--	na	1.9E+02	--	--	na	7.0E+05	--	--	na	**7.0E+05**
N-Nitrosodimethylamine[C]	0	--	--	na	8.1E+01	--	--	na	6.5E+05	--	--	na	8.1E+00	--	--	na	6.5E+04	--	--	na	**6.5E+04**
N-Nitrosodiphenylamine[C]	0	--	--	na	1.6E+02	--	--	na	1.3E+06	--	--	na	1.6E+01	--	--	na	1.3E+05	--	--	na	**1.3E+05**
N-Nitrosodi-n-propylamine[C]	0	--	--	na	1.4E+01	--	--	na	1.1E+05	--	--	na	1.4E+00	--	--	na	1.1E+04	--	--	na	**1.1E+04**
Parathion	0	6.5E-02	1.3E-02	na	--	9.6E-01	1.3E+01	na	--	1.6E-02	3.3E-03	na	--	3.3E+01	8.4E+00	na	--	**9.6E-01**	**8.4E+00**	na	--
PCB-1016	0	--	1.4E-02	na	--	--	1.4E+01	na	--	--	3.5E-03	na	--	--	9.0E+00	na	--	--	**9.0E+00**	na	--
PCB-1221	0	--	1.4E-02	na	--	--	1.4E+01	na	--	--	3.5E-03	na	--	--	9.0E+00	na	--	--	**9.0E+00**	na	--
PCB-1232	0	--	1.4E-02	na	--	--	1.4E+01	na	--	--	3.5E-03	na	--	--	9.0E+00	na	--	--	**9.0E+00**	na	--
PCB-1242	0	--	1.4E-02	na	--	--	1.4E+01	na	--	--	3.5E-03	na	--	--	9.0E+00	na	--	--	**9.0E+00**	na	--
PCB-1248	0	--	1.4E-02	na	--	--	1.4E+01	na	--	--	3.5E-03	na	--	--	9.0E+00	na	--	--	**9.0E+00**	na	--
PCB-1254	0	--	1.4E-02	na	--	--	1.4E+01	na	--	--	3.5E-03	na	--	--	9.0E+00	na	--	--	**9.0E+00**	na	--
PCB-1260	0	--	1.4E-02	na	--	--	1.4E+01	na	--	--	3.5E-03	na	--	--	9.0E+00	na	--	--	**9.0E+00**	na	--
PCB Total[C]	0	--	--	na	1.7E-03	--	--	na	1.4E+01	--	--	na	1.7E-04	--	--	na	1.4E+00	--	--	na	**1.4E+00**

Parameter	Background	Water Quality Criteria				Wasteload Allocations				Antidegradation Baseline				Antidegradation Allocations				Most Limiting Allocations			
(ug/l unless noted)	Conc.	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH
Pentachlorophenol [C]	0	1.1E+01	1.0E+01	na	8.2E+01	1.6E+02	1.0E+04	na	6.6E+05	3.3E+00	2.5E+00	na	8.2E+00	6.7E+03	6.4E+03	na	6.6E+04	**1.6E+02**	**6.4E+03**	**na**	**6.6E+04**
Phenol	0	--	--	na	4.6E+06	--	--	na	1.7E+10	--	--	na	4.6E+05	--	--	na	1.7E+09	**--**	**--**	**na**	**1.7E+09**
Pyrene	0	--	--	na	1.1E+04	--	--	na	4.0E+07	--	--	na	1.1E+03	--	--	na	4.0E+06	**--**	**--**	**na**	**4.0E+06**
Radionuclides (pCi/l except Beta/Photon)	0	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--	**--**	**--**	**na**	**--**
Gross Alpha Activity	0	--	--	na	1.5E+01	--	--	na	5.5E+04	--	--	na	1.5E+00	--	--	na	5.5E+03	**--**	**--**	**na**	**5.5E+03**
Beta and Photon Activity (mrem/yr)	0	--	--	na	4.0E+00	--	--	na	1.5E+04	--	--	na	4.0E-01	--	--	na	1.5E+03	**--**	**--**	**na**	**1.5E+03**
Strontium-90	0	--	--	na	8.0E+00	--	--	na	2.9E+04	--	--	na	8.0E-01	--	--	na	2.9E+03	**--**	**--**	**na**	**2.9E+03**
Tritium	0	--	--	na	2.0E+04	--	--	na	7.3E+07	--	--	na	2.0E+03	--	--	na	7.3E+06	**--**	**--**	**na**	**7.3E+06**
Selenium	0	2.0E+01	5.0E+00	na	1.1E+04	2.9E+02	5.1E+03	na	4.0E+07	5.0E+00	1.3E+00	na	1.1E+03	1.0E+04	3.2E+03	na	4.0E+06	**2.9E+02**	**3.2E+03**	**na**	**4.0E+06**
Silver	0	1.7E+00	--	na	--	2.5E+01	--	na	--	4.4E-01	--	na	--	9.0E+02	--	na	--	**2.5E+01**	**--**	**na**	**--**
Sulfate	0	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--	**--**	**--**	**na**	**--**
1,1,2,2-Tetrachloroethane[C]	0	--	--	na	1.1E+02	--	--	na	8.9E+05	--	--	na	1.1E+01	--	--	na	8.9E+04	**--**	**--**	**na**	**8.9E+04**
Tetrachloroethylene[C]	0	--	--	na	8.9E+01	--	--	na	7.2E+05	--	--	na	8.9E+00	--	--	na	7.2E+04	**--**	**--**	**na**	**7.2E+04**
Thallium	0	--	--	na	6.3E+00	--	--	na	2.3E+04	--	--	na	6.3E-01	--	--	na	2.3E+03	**--**	**--**	**na**	**2.3E+03**
Toluene	0	--	--	na	2.0E+05	--	--	na	7.3E+08	--	--	na	2.0E+04	--	--	na	7.3E+07	**--**	**--**	**na**	**7.3E+07**
Total dissolved solids	0	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--	**--**	**--**	**na**	**--**
Toxaphene [C]	0	7.3E-01	2.0E-04	na	7.5E-03	1.1E+01	2.0E-01	na	6.1E+01	1.8E-01	5.0E-05	na	7.5E-04	3.7E+02	1.3E-01	na	6.1E+00	**1.1E+01**	**1.3E-01**	**na**	**6.1E+00**
Tributyltin	0	4.6E-01	6.3E-02	na	--	6.8E+00	6.4E+01	na	--	1.2E-01	1.6E-02	na	--	2.4E+02	4.0E+01	na	--	**6.8E+00**	**4.0E+01**	**na**	**--**
1,2,4-Trichlorobenzene	0	--	--	na	9.4E+02	--	--	na	3.4E+06	--	--	na	9.4E+01	--	--	na	3.4E+05	**--**	**--**	**na**	**3.4E+05**
1,1,2-Trichloroethane[C]	0	--	--	na	4.2E+02	--	--	na	3.4E+06	--	--	na	4.2E+01	--	--	na	3.4E+05	**--**	**--**	**na**	**3.4E+05**
Trichloroethylene [C]	0	--	--	na	8.1E+02	--	--	na	6.5E+06	--	--	na	8.1E+01	--	--	na	6.5E+05	**--**	**--**	**na**	**6.5E+05**
2,4,6-Trichlorophenol [C]	0	--	--	na	6.5E+01	--	--	na	5.3E+05	--	--	na	6.5E+00	--	--	na	5.3E+04	**--**	**--**	**na**	**5.3E+04**
2-(2,4,5-Trichlorophenoxy) propionic acid (Silvex)	0	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--	**--**	**--**	**na**	**--**
Vinyl Chloride[C]	0	--	--	na	6.1E+01	--	--	na	4.9E+05	--	--	na	6.1E+00	--	--	na	4.9E+04	**--**	**--**	**na**	**4.9E+04**
Zinc	0	8.3E+01	8.5E+01	na	6.9E+04	1.2E+03	8.6E+04	na	2.5E+08	2.1E+01	2.1E+01	na	6.9E+03	4.3E+04	5.5E+04	na	2.5E+07	**1.2E+03**	**5.5E+04**	**na**	**2.5E+07**

Notes:

1. All concentrations expressed as micrograms/liter (ug/l), unless noted otherwise
2. Discharge flow is highest monthly average or Form 2C maximum for Industries and design flow for Municipals
3. Metals measured as Dissolved, unless specified otherwise
4. "C" indicates a carcinogenic parameter
5. Regular WLAs are mass balances (minus background concentration) using the % of stream flow entered above under Mixing Information.
   Antidegradation WLAs are based upon a complete mix.
6. Antideg. Baseline = (0.25(WQC - background conc.) + background conc.) for acute and chronic
   = (0.1(WQC - background conc.) + background conc.) for human health
7. WLAs established at the following stream flows: 1Q10 for Acute, 30Q10 for Chronic Ammonia, 7Q10 for Other Chronic, 30Q5 for Non-carcinogens, Harmonic Mean for Carcinogens, and Annual Average for Dioxin. Mixing ratios may be substituted for stream flows where appropriate.

Metal	Target Value (SSTV)
Antimony	1.6E+06
Arsenic	2.0E+03
Barium	na
Cadmium	1.5E+01
Chromium III	2.4E+03
Chromium VI	9.4E+01
Copper	5.4E+01
Iron	na
Lead	4.2E+02
Manganese	na
Mercury	8.2E+00
Nickel	7.6E+02
Selenium	1.2E+02
Silver	1.0E+01
Zinc	4.9E+02

Note: do not use QL's lower than the minimum QL's provided in agency guidance

0.200 MGD DISCHARGE FLOW - STREAM MIX PER "Mix.exe"

Discharge Flow Used for WQS-WLA Calculations (MGD 0.200

	Stream Flows Allocated to Mix (MGD)		Total Mix Flows Stream + Discharge (MGD)	
	Dry Season	Wet Season	Dry Season	Wet Season
1Q10	2.740	604.000	2.940	604.200
7Q10	202.156	N/A	202.356	N/A
30Q10	307.008	640.000	307.208	640.200
30Q5	732.000	N/A	732.200	N/A
Harm. Mean	1616.000	N/A	1616.200	N/A
Annual Avg.	0.000	N/A	0.200	N/A

Stream/Discharge Mix Values

	Dry Season	Wet Season
1Q10 90th% Temp. Mix (deg C)	24.550	17.300
30Q10 90th% Temp. Mix (deg C)	24.699	17.300
1Q10 90th% pH Mix (SU)	8.432	8.599
30Q10 90th% pH Mix (SU)	8.598	8.599
1Q10 10th% pH Mix (SU)	7.193	N/A
7Q10 10th% pH Mix (SU)	7.396	N/A
	Calculated	Formula Inputs
1Q10 Hardness (mg/L as CaCO3)	66.8	66.8
7Q10 Hardness (mg/L as CaCO3)	67.8	67.8

Ammonia - Dry Season - Acute

90th Percentile pH (SU)	8.432
(7.204 - pH)	-1.228
(pH - 7.204)	1.228
Trout Present Criterion (mg N/l	2.438
Trout Absent Criterion (mg N/L	3.650
Trout Present?	n
Effective Criterion (mg N/L)	3.650

Ammonia - Dry Season - Chronic

90th Percentile Temp. (deg C)	24.699
90th Percentile pH (SU)	8.598
MIN	1.478
MAX	24.699
(7.688 - pH)	-0.910
(pH - 7.688)	0.910
Early LS Present Criterion (mg N	0.479
Early LS Absent Criterion (mg N/	0.479
Early Life Stages Present?	y
Effective Criterion (mg N/L)	0.479

Ammonia - Wet Season - Acute

90th Percentile pH (SU)	8.599
(7.204 - pH)	-1.395
(pH - 7.204)	1.395
Trout Present Criterion (mg N/l	1.774
Trout Absent Criterion (mg N/L	2.656
Trout Present?	n
Effective Criterion (mg N/L)	2.656

Ammonia - Wet Season - Chronic

90th Percentile Temp. (deg C)	17.300
90th Percentile pH (SU)	8.599
MIN	2.382
MAX	17.300
(7.688 - pH)	-0.911
(pH - 7.688)	0.911
Early LS Present Criterion (mg N	0.770
Early LS Absent Criterion (mg N/	0.770
Early Life Stages Present?	y
Effective Criterion (mg N/L)	0.770

0.200 MGD DISCHARGE FLOW - COMPLETE STREAM MIX

Discharge Flow Used for WQS-WLA Calculations (MGD 0.200

	100% Stream Flows Allocated to Mix (MGD)		Total Mix Flows Stream + Discharge (MGD)	
	Dry Season	Wet Season	Dry Season	Wet Season
1Q10	409.000	604.000	409.200	604.200
7Q10	514.000	N/A	514.200	N/A
30Q10	640.000	640.000	640.200	640.200
30Q5	732.000	N/A	732.200	N/A
Harm. Mean	1616.000	N/A	1616.200	N/A
Annual Avg.	0.000	N/A	0.200	N/A

Stream/Discharge Mix Values

	Dry Season	Wet Season
1Q10 90th% Temp. Mix (deg C)	24.699	17.300
30Q10 90th% Temp. Mix (deg C)	24.699	17.300
1Q10 90th% pH Mix (SU)	8.599	8.599
30Q10 90th% pH Mix (SU)	8.599	8.599
1Q10 10th% pH Mix (SU)	7.398	N/A
7Q10 10th% pH Mix (SU)	7.398	N/A
	Calculated	Formula Inputs
1Q10 Hardness (mg/L as CaCO3) =	67.793	67.793
7Q10 Hardness (mg/L as CaCO3) =	67.795	67.795

Ammonia - Dry Season - Acute

90th Percentile pH (SU)	8.599
(7.204 - pH)	-1.395
(pH - 7.204)	1.395
Trout Present Criterion (mg N/l	1.776
Trout Absent Criterion (mg N/L	2.658
Trout Present?	n
Effective Criterion (mg N/L)	2.658

Ammonia - Dry Season - Chronic

90th Percentile Temp. (deg C)	24.699
90th Percentile pH (SU)	8.599
MIN	1.478
MAX	24.699
(7.688 - pH)	-0.911
(pH - 7.688)	0.911
Early LS Present Criterion (mg N	0.478
Early LS Absent Criterion (mg N/	0.478
Early Life Stages Present?	y
Effective Criterion (mg N/L)	0.478

Ammonia - Wet Season - Acute

90th Percentile pH (SU)	8.599
(7.204 - pH)	-1.395
(pH - 7.204)	1.395
Trout Present Criterion (mg N/l	1.774
Trout Absent Criterion (mg N/L	2.656
Trout Present?	n
Effective Criterion (mg N/L)	2.656

Ammonia - Wet Season - Chronic

90th Percentile Temp. (deg C)	17.300
90th Percentile pH (SU)	8.599
MIN	2.382
MAX	17.300
(7.688 - pH)	-0.911
(pH - 7.688)	0.911
Early LS Present Criterion (mg N	0.770
Early LS Absent Criterion (mg N/	0.770
Early Life Stages Present?	y
Effective Criterion (mg N/L)	0.770

9/11/2008 3:34:12 PM

Facility = Pembroke WWTP
Chemical = ammonia (mg/L)
Chronic averaging period = 30
WLAa = 54
WLAc = 380
Q.L. = 0.2
# samples/mo. = 12
# samples/wk. = 3

Summary of Statistics:

observations = 1
Expected Value = 9
Variance = 29.16
C.V. = 0.6
97th percentile daily values = 21.9007
97th percentile 4 day average = 14.9741
97th percentile 30 day average= 10.8544
< Q.L. = 0
Model used = BPJ Assumptions, type 2 data

No Limit is required for this material

The data are:

9

9/11/2008 3:37:20 PM

Facility = Pembroke WWTP
Chemical = TRC (ug/L)
Chronic averaging period = 4
WLAa = 280
WLAc = 7100
Q.L. = 100
# samples/mo. = 30
# samples/wk. = 8

Summary of Statistics:

observations = 1
Expected Value = 1000
Variance = 360000
C.V. = 0.6
97th percentile daily values = 2433.41
97th percentile 4 day average = 1663.79
97th percentile 30 day average= 1206.05
< Q.L. = 0
Model used = BPJ Assumptions, type 2 data

A limit is needed based on Acute Toxicity
Maximum Daily Limit = 280
Average Weekly limit = 167.021424052622
Average Monthly LImit = 138.77392588295

The data are:

1000

9/11/2008 3:39:27 PM

Facility = Pembroke WWTP
Chemical = hydrogen sulfide (ug/L)
Chronic averaging period = 4
WLAa =
WLAc = 1300
Q.L. = 1
# samples/mo. = 1
# samples/wk. = 1

Summary of Statistics:

observations = 1
Expected Value = 1.4
Variance = .7056
C.V. = 0.6
97th percentile daily values = 3.40678
97th percentile 4 day average = 2.32930
97th percentile 30 day average= 1.68847
< Q.L. = 0
Model used = BPJ Assumptions, type 2 data

No Limit is required for this material

The data are:

1.4

9/11/2008 3:42:24 PM

Facility = Pembroke WWTP
Chemical = total recoverable zinc (ug/L)
Chronic averaging period = 4
WLAa = 1200
WLAc = 55000
Q.L. = 10
# samples/mo. = 50
# samples/wk. = 13

Summary of Statistics:

observations = 1
Expected Value = 89
Variance = 2851.56
C.V. = 0.6
97th percentile daily values = 216.574
97th percentile 4 day average = 148.077
97th percentile 30 day average= 107.338
< Q.L. = 0
Model used = BPJ Assumptions, type 2 data

No Limit is required for this material

The data are:

89

9/19/2008 3:54:00 PM

Facility = Pembroke WWTP
Chemical = total recoverable copper (ug/L)
Chronic averaging period = 4
WLAa = 140
WLAc = 4100
Q.L. = 10
# samples/mo. = 1
# samples/wk. = 1

Summary of Statistics:

observations = 1
Expected Value = 12
Variance = 51.84
C.V. = 0.6
97th percentile daily values = 29.2010
97th percentile 4 day average = 19.9654
97th percentile 30 day average= 14.4726
< Q.L. = 0
Model used = BPJ Assumptions, type 2 data

No Limit is required for this material

The data are:

12

Attachment H

Regional Water Quality Model (Version 4.0)

"Model Run For C:\Documents and Settings\blfrance\My Documents\Working files\BECKY\PERMITS\VPDES\Pembroke WWTP\Reissuance 2008\Data\pembroke do mode 2008.mod On 9/19/2008 11:09:52 AM"

"Model is for NEW RIVER."
"Model starts at the PEMBROKE WWTP discharge."

"Background Data"
"7Q10", "cBOD5", "TKN", "DO", "Temp"
"(mgd)", "(mg/l)", "(mg/l)", "(mg/l)", "deg C"
513.9171,2, 0, 7.095, 24.7

"Discharge/Tributary Input Data for Segment 1"
"Flow", "cBOD5", "TKN", "DO", "Temp"
"(mgd)", "(mg/l)", "(mg/l)", "(mg/l)", "deg C"
.2, 30, 20, ,0, 22.5

"Hydraulic Information for Segment 1"
"Length","Width", "Depth", "Velocity"
"(mi)", "(ft)", "(ft)", "(ft/sec)"
.60606, 749.999, 2.1, .505

"Initial Mix Values for Segment 1"
"Flow", "DO", "cBOD", "nBOD", "DOSat", "Temp"
"(mgd)", "(mg/l)", "(mg/l)", "(mg/l)", "(mg/l)", "deg C"
514.1171,7.092, 5.027, .029, 7.884, 24.69914

"Rate Constants for Segment 1. - (All units Per Day)"
"k1", "k1@T", "k2", "k2@T", "kn", "kn@T", "BD", "BD@T"
.5, .62, 3.96, 4.427, .25, .359, 0, 0

"Output for Segment 1"
"Segment starts at PEMBROKE WWTP"
"Total", "Segm."
"Dist.", "Dist.", "DO", "cBOD", "nBOD"
"(mi)", "(mi)", "(mg/l)", "(mg/l)", "(mg/l)"
0, 0, 7.092, 5.027, .029
.1, .1, 7.096, 5, .029
.2, .2, 7.096, 5, .029
.3, .3, 7.096, 5, .029
.4, .4, 7.096, 5, .029
.5, .5, 7.096, 5, .029
.606, .606, 7.096, 5, .029

"END OF FILE"

REGIONAL MODELING SYSTEM VERSION 4.0

Model Input File for the Discharge to NEW RIVER.

File Information

File Name:	C:\Documents and Settings\blfrance\My Documents\Working files\BECKY\F
Date Modified:	September 19, 2008

Water Quality Standards Information

Stream Name:	NEW RIVER
River Basin:	New River Basin
Section:	1
Class:	IV - Mountainous Zones Waters
Special Standards:	u

Background Flow Information

Gauge Used:	Eggleston Gauge
Gauge Drainage Area:	2941 Sq.Mi.
Gauge 7Q10 Flow:	498 MGD
Headwater Drainage Area:	3035 Sq.Mi.
Headwater 7Q10 Flow:	513.9171 MGD (Net; includes Withdrawals/Discharges)
Withdrawal/Discharges:	0 MGD
Incremental Flow in Segments:	0.1693302 MGD/Sq.Mi.

Background Water Quality

Background Temperature:	24.7 Degrees C
Background cBOD5:	2 mg/l
Background TKN:	0 mg/l
Background D.O.:	7.095258 mg/l

Model Segmentation

Number of Segments:	1
Model Start Elevation:	1680 ft above MSL
Model End Elevation:	1676 ft above MSL

REGIONAL MODELING SYSTEM VERSION 4.0

Model Input File for the Discharge to NEW RIVER.

Segment Information for Segment 1

Definition Information

Segment Definition:	A discharge enters.
Discharge Name:	PEMBROKE WWTP
VPDES Permit No.:	

Discharger Flow Information

Flow:	0.2 MGD
cBOD5:	30 mg/l
TKN:	20 mg/l
D.O.:	0 mg/l
Temperature:	22.5 Degrees C

Geographic Information

Segment Length:	0.60606 miles
Upstream Drainage Area:	3035 Sq.Mi.
Downstream Drainage Area:	0 Sq.Mi.
Upstream Elevation:	1680 Ft.
Downstream Elevation:	1676 Ft.

Hydraulic Information

Segment Width:	749.999 Ft.
Segment Depth:	2.1 Ft.
Segment Velocity:	0.505 Ft./Sec.
Segment Flow:	514.117 MGD
Incremental Flow:	-513.917 MGD (Applied at end of segment.)

Channel Information

Cross Section:	Rectangular
Character:	Moderately Meandering
Pool and Riffle:	No
Bottom Type:	Large Rock
Sludge:	None
Plants:	None
Algae:	None

REGIONAL MODELING SYSTEM VERSION 4.0

Model Input File for the Discharge to NEW RIVER.

File Information

File Name:	C:\Documents and Settings\blfrance\My Documents\Working files\BECKY\F
Date Modified:	September 19, 2008

Water Quality Standards Information

Stream Name:	NEW RIVER
River Basin:	New River Basin
Section:	1
Class:	IV - Mountainous Zones Waters
Special Standards:	u

Background Flow Information

Gauge Used:	Eggleston Gauge
Gauge Drainage Area:	2941 Sq.Mi.
Gauge 7Q10 Flow:	498 MGD
Headwater Drainage Area:	3035 Sq.Mi.
Headwater 7Q10 Flow:	513.9171 MGD (Net; includes Withdrawals/Discharges)
Withdrawal/Discharges:	0 MGD
Incremental Flow in Segments:	0.1693302 MGD/Sq.Mi.

Background Water Quality

Background Temperature:	24.7 Degrees C
Background cBOD5:	2 mg/l
Background TKN:	0 mg/l
Background D.O.:	7.095258 mg/l

Model Segmentation

Number of Segments:	1
Model Start Elevation:	1680 ft above MSL
Model End Elevation:	1676 ft above MSL

REGIONAL MODELING SYSTEM VERSION 4.0

Model Input File for the Discharge to NEW RIVER.

Segment Information for Segment 1

Definition Information

Segment Definition:	A discharge enters.
Discharge Name:	PEMBROKE WWTP
VPDES Permit No.:	

Discharger Flow Information

Flow:	0.2 MGD
cBOD5:	30 mg/l
TKN:	20 mg/l
D.O.:	0 mg/l
Temperature:	22.5 Degrees C

Geographic Information

Segment Length:	0.60606 miles
Upstream Drainage Area:	3035 Sq.Mi.
Downstream Drainage Area:	0 Sq.Mi.
Upstream Elevation:	1680 Ft.
Downstream Elevation:	1676 Ft.

Hydraulic Information

Segment Width:	749.999 Ft.
Segment Depth:	2.1 Ft.
Segment Velocity:	0.505 Ft./Sec.
Segment Flow:	514.117 MGD
Incremental Flow:	-513.917 MGD (Applied at end of segment.)

Channel Information

Cross Section:	Rectangular
Character:	Moderately Meandering
Pool and Riffle:	No
Bottom Type:	Large Rock
Sludge:	None
Plants:	None
Algae:	None

Attachment I

Public Notice

PUBLIC NOTICE – Environmental Permit

PURPOSE OF NOTICE: To seek public comment on a draft permit from the Department of Environmental Quality that will allow the release of treated wastewater into a water body in Giles County.
PUBLIC COMMENT PERIOD: 30 days following the public notice issue date; comment period ends 4:30 pm of last day
PERMIT NAME: Virginia Pollutant Discharge Elimination System Permit – Wastewater issued by DEQ, under the authority of the State Water Control Board
APPLICANT NAME, ADDRESS, AND PERMIT NUMBER: Town of Pembroke, PO Box 5, Pembroke, VA 24136, VA0088048
FACILITY NAME AND LOCATION: Pembroke WWTP, 126 Park Lane, Pembroke, VA 24136
PROJECT DESCRIPTION: Pembroke WWTP has applied for a reissuance of a permit for the public wastewater treatment plant in Giles County. The applicant proposes to release treated sewage wastewater at a rate of 0.20 MGD from the current facility into a water body. Sludge from the treatment process will be periodically transported to the New River Resource Authority for disposal. The facility proposes to release the treated sewage into the New River in the New River Watershed (VAW-L24R). A watershed is the land area drained by a river and its incoming streams. The permit will limit the following pollutants to amounts that protect water quality: organic matter, solids, nutrients
HOW TO COMMENT: DEQ accepts comments by e-mail, fax, or postal mail. All comments and requests must be in writing and be received by DEQ during the comment period. Submittals must include the names, mailing addresses and telephone numbers of the commenter/requester and of all persons represented by the commenter/requester. A request for a public hearing must also include: 1) The reason why a public hearing is requested. 2) A brief, informal statement regarding the nature and extent of the interest of the requester or of those represented by the requestor, including how and to what extent such interest would be directly and adversely affected by the permit. 3) Specific references, where possible, to terms and conditions of the permit with suggested revisions. DEQ may hold a public hearing, including another comment period, if a public response is significant and there are substantial, disputed issues relevant to the permit
CONTACT FOR PUBLIC COMMENTS, DOCUMENT REQUESTS, AND ADDITIONAL INFORMATION:
NAME: Becky L. France; ADDRESS: Virginia Department of Environmental Quality, West Central Regional Office, 3019 Peters Creek Road, Roanoke, VA 24019-2738; PHONE: (540) 562-6700; E-MAIL ADDRESS: blfrance@deq.virginia.gov; FAX: (540) 562-6725. The public may review the draft permit and application at the DEQ office named above by appointment.

Attachment J

EPA Checksheet

Revised 2/2003

State "FY2003 Transmittal Checklist" to Assist in Targeting Municipal and Industrial Individual NPDES Draft Permits for Review

Part I. State Draft Permit Submission Checklist

In accordance with the MOA established between the Commonwealth of Virginia and the United States Environmental Protection Agency, Region III, the Commonwealth submits the following draft National Pollutant Discharge Elimination System (NPDES) permit for Agency review and concurrence.

Facility Name: Pembroke WWTP

NPDES Permit Number: VA0088048

Permit Writer Name: Becky L. France

Date: 09/19/08

Major [ ] **Minor** [X] **Industrial** [ ] **Municipal** [X]

I.A. Draft Permit Package Submittal Includes:	**Yes**	**No**	**N/A**
1. Permit Application?	X		
2. Complete Draft Permit (for renewal or first time permit – entire permit, including boilerplate information)?	X		
3. Copy of Public Notice?	X		
4. Complete Fact Sheet?	X		
5. A Priority Pollutant Screening to determine parameters of concern?	X		
6. A Reasonable Potential analysis showing calculated WQBELs?	X		
7. Dissolved Oxygen calculations?		X	
8. Whole Effluent Toxicity Test summary and analysis?			X
9. Permit Rating Sheet for new or modified industrial facilities?			X

I.B. Permit/Facility Characteristics	**Yes**	**No**	**N/A**
1. Is this a new, or currently unpermitted facility?		X	
2. Are all permissible outfalls (including combined sewer overflow points, non-process water and storm water) from the facility properly identified and authorized in the permit?	X		
3. Does the fact sheet **or** permit contain a description of the wastewater treatment process?	X		

I.B. Permit/Facility Characteristics – cont. (FY2003)	Yes	No	N/A
4. Does the review of PCS/DMR data for at least the last 3 years indicate significant non-compliance with the existing permit?		X	
5. Has there been any change in streamflow characteristics since the last permit was developed?	X		
6. Does the permit allow the discharge of new or increased loadings of any pollutants?		X	
7. Does the fact sheet **or** permit provide a description of the receiving water body(s) to which the facility discharges, including information on low/critical flow conditions and designated/existing uses?	X		
8. Does the facility discharge to a 303(d) listed water?	X		
a. Has a TMDL been developed and approved by EPA for the impaired water?		X	
b. Does the record indicate that the TMDL development is on the State priority list and will most likely be developed within the life of the permit?	X		
c. Does the facility discharge a pollutant of concern identified in the TMDL or 303(d) listed water?		X	
9. Have any limits been removed, or are any limits less stringent, than those in the current permit?		X	
10. Does the permit authorize discharges of storm water?			X
11. Has the facility substantially enlarged or altered its operation or substantially increased its flow or production?		X	
12. Are there any production-based, technology-based effluent limits in the permit?		X	
13. Do any water quality-based effluent limit calculations differ from the State's standard policies or procedures?		X	
14. Are any WQBELs based on an interpretation of narrative criteria?		X	
15. Does the permit incorporate any variances or other exceptions to the State's standards or regulations?		X	
16. Does the permit contain a compliance schedule for any limit or condition?	X		
17. Is there a potential impact to endangered/threatened species or their habitat by the facility's discharge(s)?		X	
18. Have impacts from the discharge(s) at downstream potable water supplies been evaluated?			X
19. Is there any indication that there is significant public interest in the permit action proposed for this facility?		X	
20. Have previous permit, application, and fact sheet been examined?	X		

Part II. NPDES Draft Permit Checklist (FY2003)

Region III NPDES Permit Quality Checklist – for POTWs

(To be completed and included in the record only for POTWs)

II.A. Permit Cover Page/Administration	Yes	No	N/A
1. Does the fact sheet or permit describe the physical location of the facility, including latitude and longitude (not necessarily on permit cover page)?	X		
2. Does the permit contain specific authorization-to-discharge information (from where to where, by whom)?	X		

II.B. Effluent Limits – General Elements	Yes	No	N/A
1. Does the fact sheet describe the basis of final limits in the permit (e.g., that a comparison of technology and water quality-based limits was performed, and the most stringent limit selected)?	X		
2. Does the fact sheet discuss whether "antibacksliding" provisions were met for any limits that are less stringent than those in the previous NPDES permit?			X

II.C. Technology-Based Effluent Limits (POTWs)	Yes	No	N/A
1. Does the permit contain numeric limits for ALL of the following: BOD (or alternative, e.g., CBOD, COD, TOC), TSS, and pH?	X		
2. Does the permit require at least 85% removal for BOD (or BOD alternative) and TSS (or 65% for equivalent to secondary) consistent with 40 CFR Part 133?	X		
a. If no, does the record indicate that application of WQBELs, or some other means, results in more stringent requirements than 85% removal or that an exception consistent with 40 CFR 133.103 has been approved?			X
3. Are technology-based permit limits expressed in the appropriate units of measure (e.g., concentration, mass, SU)?	X		
4. Are permit limits for BOD and TSS expressed in terms of both long term (e.g., average monthly) and short term (e.g., average weekly) limits?	X		
5. Are any concentration limitations in the permit less stringent than the secondary treatment requirements (30 mg/l BOD5 and TSS for a 30-day average and 45 mg/l BOD5 and TSS for a 7-day average)?		X	
a. If yes, does the record provide a justification (e.g., waste stabilization pond, trickling filter, etc.) for the alternate limitations?			X

II.D. Water Quality-Based Effluent Limits	Yes	No	N/A
1. Does the permit include appropriate limitations consistent with 40 CFR 122.44(d) covering State narrative and numeric criteria for water quality?	X		
2. Does the fact sheet indicate that any WQBELs were derived from a completed and EPA approved TMDL?			X

II.D. Water Quality-Based Effluent Limits – cont. (FY2003)	Yes	No	N/A
3. Does the fact sheet provide effluent characteristics for each outfall?	X		
4. Does the fact sheet document that a "reasonable potential" evaluation was performed?	X		
a. If yes, does the fact sheet indicate that the "reasonable potential" evaluation was performed in accordance with the State's approved procedures?	X		
b. Does the fact sheet describe the basis for allowing or disallowing in-stream dilution or a mixing zone?	X		
c. Does the fact sheet present WLA calculation procedures for all pollutants that were found to have "reasonable potential"?	X		
d. Does the fact sheet indicate that the "reasonable potential" and WLA calculations accounted for contributions from upstream sources (i.e., do calculations include ambient/background concentrations)?			X
e. Does the permit contain numeric effluent limits for all pollutants for which "reasonable potential" was determined?	X		
5. Are all final WQBELs in the permit consistent with the justification and/or documentation provided in the fact sheet?	X		
6. For all final WQBELs, are BOTH long-term AND short-term effluent limits established?	X		
7. Are WQBELs expressed in the permit using appropriate units of measure (e.g., mass, concentration)?	X		
8. Does the record indicate that an "antidegradation" review was performed in accordance with the State's approved antidegradation policy?	X		

II.E. Monitoring and Reporting Requirements	Yes	No	N/A
1. Does the permit require at least annual monitoring for all limited parameters and other monitoring as required by State and Federal regulations?	X		
a. If no, does the fact sheet indicate that the facility applied for and was granted a monitoring waiver, AND, does the permit specifically incorporate this waiver?			X
2. Does the permit identify the physical location where monitoring is to be performed for each outfall?	X		
3. Does the permit require at least annual influent monitoring for BOD (or BOD alternative) and TSS to assess compliance with applicable percent removal requirements?		X	
4. Does the permit require testing for Whole Effluent Toxicity?		X	

II.F. Special Conditions	Yes	No	N/A
1. Does the permit include appropriate biosolids use/disposal requirements?	X		
2. Does the permit include appropriate storm water program requirements?			X

II.F. Special Conditions – cont. (FY2003)	Yes	No	N/A
3. If the permit contains compliance schedule(s), are they consistent with statutory and regulatory deadlines and requirements?	X		
4. Are other special conditions (e.g., ambient sampling, mixing studies, TIE/TRE, BMPs, special studies) consistent with CWA and NPDES regulations?	X		
5. Does the permit allow/authorize discharge of sanitary sewage from points other than the POTW outfall(s) or CSO outfalls [i.e., Sanitary Sewer Overflows (SSOs) or treatment plant bypasses]?			X
6. Does the permit authorize discharges from Combined Sewer Overflows (CSOs)?			X
a. Does the permit require implementation of the "Nine Minimum Controls"?			X
b. Does the permit require development and implementation of a "Long Term Control Plan"?			X
c. Does the permit require monitoring and reporting for CSO events?			X
7. Does the permit include appropriate Pretreatment Program requirements?			X

II.G. Standard Conditions	Yes	No	N/A
1. Does the **permit** contain all 40 CFR 122.41 standard conditions or the State equivalent (or more stringent) conditions?	X		

List of Standard Conditions – 40 CFR 122.41

Duty to comply
Duty to reapply
Need to halt or reduce activity not a defense
Duty to mitigate
Proper O & M
Permit actions
Property rights
Duty to provide information
Inspections and entry
Monitoring and records
Signatory requirement
Bypass
Upset
Reporting Requirements
Planned change
Anticipated noncompliance
Transfers
Monitoring reports
Compliance schedules
24-Hour reporting
Other non-compliance

2. Does the permit contain the additional standard condition (or the State equivalent or more stringent conditions) for POTWs regarding notification of new introduction of pollutants and new industrial users [40 CFR 122.42(b)]?	X		

Part II. NPDES Draft Permit Checklist (FY2003)

Region III NPDES Permit Quality Review Checklist – For Non-Municipals

(To be completed and included in the record for all non-POTWs)

II.A. Permit Cover Page/Administration	Yes	No	N/A
1. Does the fact sheet **or** permit describe the physical location of the facility, including latitude and longitude (not necessarily on permit cover page)?			
2. Does the permit contain specific authorization-to-discharge information (from where to where, by whom)?			

II.B. Effluent Limits – General Elements	Yes	No	N/A
1. Does the fact sheet describe the basis of final limits in the permit (e.g., that a comparison of technology and water quality-based limits was performed, and the most stringent limit selected)?			
2. Does the fact sheet discuss whether "antibacksliding" provisions were met for any limits that are less stringent than those in the previous NPDES permit?			

II.C. Technology-Based Effluent Limits (Effluent Guidelines & BPJ)	Yes	No	N/A
1. Is the facility subject to a national effluent limitations guideline (ELG)?			
a. If yes, does the record adequately document the categorization process, including an evaluation of whether the facility is a new source or an existing source?			
b. If no, does the record indicate that a technology-based analysis based on Best Professional Judgement (BPJ) was used for all pollutants of concern discharged at treatable concentrations?			
2. For all limits developed based on BPJ, does the record indicate that the limits are consistent with the criteria established at 40 CFR 125.3(d)?			
3. Does the fact sheet adequately document the calculations used to develop both ELG and /or BPJ technology-based effluent limits?			
4. For all limits that are based on production or flow, does the record indicate that the calculations are based on a "reasonable measure of ACTUAL production" for the facility (not design)?			
5. Does the permit contain "tiered" limits that reflect projected increases in production or flow?			
a. If yes, does the permit require the facility to notify the permitting authority when alternate levels of production or flow are attained?			
6. Are technology-based permit limits expressed in appropriate units of measure (e.g., concentration, mass, SU)?			

II.C. Technology-Based Effluent Limits (Effluent Guidelines & BPJ) – cont.	Yes	No	N/A
7. Are all technology-based limits expressed in terms of both maximum daily, weekly average, and/or monthly average limits?			
8. Are any final limits less stringent than required by applicable effluent limitations guidelines or BPJ?			

II.D. Water Quality-Based Effluent Limits	Yes	No	N/A
1. Does the permit include appropriate limitations consistent with 40 CFR 122.44(d) covering State narrative and numeric criteria for water quality?			
2. Does the record indicate that any WQBELs were derived from a completed and EPA approved TMDL?			
3. Does the fact sheet provide effluent characteristics for each outfall?			
4. Does the fact sheet document that a "reasonable potential" evaluation was performed?			
a. If yes, does the fact sheet indicate that the "reasonable potential" evaluation was performed in accordance with the State's approved procedures?			
b. Does the fact sheet describe the basis for allowing or disallowing in-stream dilution or a mixing zone?			
c. Does the fact sheet present WLA calculation procedures for all pollutants that were found to have "reasonable potential"?			
d. Does the fact sheet indicate that the "reasonable potential" and WLA calculations accounted for contributions from upstream sources (i.e., do calculations include ambient/background concentrations where data are available)?			
e. Does the permit contain numeric effluent limits for all pollutants for which "reasonable potential" was determined?			
5. Are all final WQBELs in the permit consistent with the justification and/or documentation provided in the fact sheet?			
6. For all final WQBELs, are BOTH long-term (e.g., average monthly) AND short-term (e.g., maximum daily, weekly average, instantaneous) effluent limits established?			
7. Are WQBELs expressed in the permit using appropriate units of measure (e.g., mass, concentration)?			
8. Does the fact sheet indicate that an "antidegradation" review was performed in accordance with the State's approved antidegradation policy?			

II.E. Monitoring and Reporting Requirements (FY2003)	Yes	No	N/A
1. Does the permit require at least annual monitoring for all limited parameters?			
a. If no, does the fact sheet indicate that the facility applied for and was granted a monitoring waiver, AND, does the permit specifically incorporate this waiver?			
2. Does the permit identify the physical location where monitoring is to be performed for each outfall?			
3. Does the permit require testing for Whole Effluent Toxicity in accordance with the State's standard practices?			

II.F. Special Conditions	Yes	No	N/A
1. Does the permit require development and implementation of a Best Management Practices (BMP) plan or site-specific BMPs?			
a. If yes, does the permit adequately incorporate and require compliance with the BMPs?			
2. If the permit contains compliance schedule(s), are they consistent with statutory and regulatory deadlines and requirements?			
3. Are other special conditions (e.g., ambient sampling, mixing studies, TIE/TRE, BMPs, special studies) consistent with CWA and NPDES regulations?			

II.G. Standard Conditions	Yes	No	N/A
1. Does the **permit** contain all 40 CFR 122.41 standard conditions or the State equivalent (or more stringent) conditions?			

List of Standard Conditions – 40 CFR 122.41

Duty to comply
Duty to reapply
Need to halt or reduce activity not a defense
Duty to mitigate
Proper O & M
Permit actions
Property rights
Duty to provide information
Inspections and entry
Monitoring and records
Signatory requirement
Bypass
Upset
Reporting Requirements
Planned change
Anticipated noncompliance
Transfers
Monitoring reports
Compliance schedules
24-Hour reporting
Other non-compliance

2. Does the permit contain the additional standard condition (or the State equivalent or more stringent conditions) for existing non-municipal dischargers regarding pollutant notification levels [40 CFR 122.42(a)]?			

Part III. Signature Page (FY2003)

Based on a review of the data and other information submitted by the permit applicant, and the draft permit and other administrative records generated by the Department/Division and/or made available to the Department/Division, the information provided on this checklist is accurate and complete, to the best of my knowledge.

Name	Becky L. France
Title	Environmental Engineer Senior
Signature	Becky L France
Date	9/19/08